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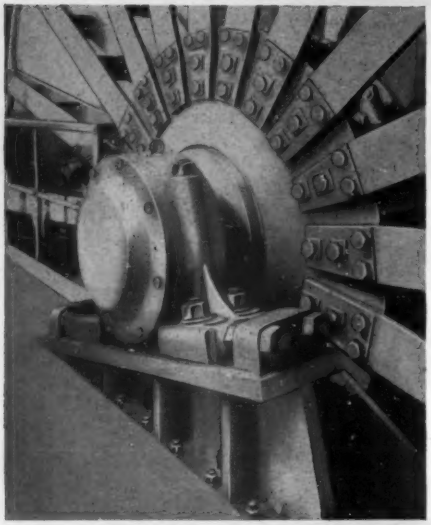

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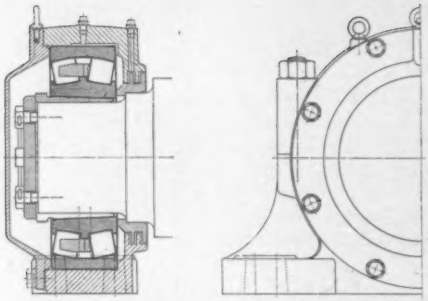

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IRON AND COAL
TRADES REVIEW

Vol. 181 August 26, 1960 No. 4,806

Domestic Coal

IF there is one thing which is certain in such an uncertain trade as the domestic coal trade, it is surely the desire of good, honest merchants that they should be free of the constant slurs cast on them. If they are not being pilloried for giving short-weight, they are being castigated on the grounds that they manifest irresponsible opposition to the implementation of the Clean Air Act; and now the latest report of the Domestic Coal Consumers' Council advocates legislation to compel all coal traders to state the National Coal Board grouping of the different coals they sell.

Once again, reputable merchants—and that means the merchants responsible for the distribution of the bulk of the domestic coal sold in this country—find themselves the target of criticism which is unjustified and unfair.

The Domestic Coal Consumers' Council is not to blame, for in making its recommendations the council states that it is satisfied that most members of the trade, both large and small, are doing their best to provide consumers with good service at a reasonable price. Unfortunately, it is not the tribute to the majority which hits the headlines, but the criticism of the minority.

Any action, not excluding legislation, which would eliminate malpractices and minimize the accusation of bad faith levelled against honest traders should be welcomed by all concerned in distribution. There would undoubtedly be difficulties in framing suitable legislation and probably, also, in implementing it, but if those difficulties could be overcome it would surely be of the greatest value to the domestic coal trade as a whole.

Too often people who are going to be affected by new laws are not alive to the position until it is too late to do anything except to grumble. Is there not here a case for the trade to take the initiative? No reputable merchant sets out to swindle the consumer, and no reputable merchant wants to continue to be subjected to constant unjustified accusations. The leading merchants know that it is in their interest that the public should have a fair deal and should realize that they are having it, but they know also that there are practical difficulties in framing an Act which is workable and which will effectively penalize the wrong-doer, without putting an intolerable additional burden on the shoulders of the already harassed depot manager.

It is by no means certain that legislation on the lines envisaged would be effective or would hit the right people, and it could give endless work both to the inspectors who would presumably have to be appointed and to the staffs of honest merchants. It is not apparent how complaints from the consumer could be dealt with unless a meticulous examination of the merchant's records was embarked upon on every occasion that a customer felt that he had cause for complaint.

Coal is a natural product with natural variations in characteristics, not merely in the case of different coals from within the same group, but also in the case of different coals from the same pit and even from the same seam. These variations are bound to result in inconsistency which, in turn, is likely to result in complaints from the public that the coal belongs to a different group. The fact that it does indeed belong to the same group can only be established by an investigation into each individual case, which would probably require an army of investigators and the expenditure of a vast amount of time by depot staffs.

From time to time coals are changed from one group to another, and the problem of identifying a particular group in stocks put down in the summer and lifted in the winter is one of obvious difficulty. Proof of an offence having been committed could probably be provided only from the evidence of a merchant's own books; and, as was found during the period of control during the war, the unreliable merchant is the one who most frequently fails to keep satisfactory books which would furnish the necessary proof, and it is further to be doubted whether men engaged mainly in the trolley service keep records of any value.

The fact remains that the trade should not shirk the issue, and it might well be in the interests of merchants to get round a table and see if it is possible to thrash out practical suggestions. They could then go to the Minister and, pointing out that they are just as keen on the trade being cleared of any charge of dishonesty as is the Domestic Coal Consumers' Council, put forward the lines upon which they believe rules could be framed to give effect to the council's recommendations.

The pitfalls which could arise from ill-conceived legislation are a real danger, and can best be avoided if the guidance of the trade is made available before, and not after, a Bill is drafted or official rules are laid down.

Copies of the Index to Vol. 180 are obtainable (post free) on application to the Publisher.

Passing Thoughts . . .

WHAT happens to the steelworkers at Llanelly has not been mentioned in this political turmoil, just as the future of the Scottish steelworkers was forgotten in protest against a loan to put a new strip mill in a socially desirable, if economically doubtful place. One is left wondering when there will be a Messianic hand to stay political Abrahams as they prepare to slay their sons in sacrificial devotion.—MR. HARRY DOUGLASS, general secretary of the Iron and Steel Trades Confederation, writing in the federation journal, Man and Metal.

MR. HARRY DOUGLASS

It isn't the boss who is the traditional enemy of the working man any longer. It's the power-seeking rabble-rouser whose unofficial leadership can cause hardship and misery.—Doncaster Chronicle.

The supercession of coal by other fuels is inevitable, and the only problem is that of humanizing the process . . . I have no regrets about the contraction of the coal industry, because I have always believed that men should work in the pits only if there is no other way of getting a living.—MR. ARTHUR HORNER, former secretary of the National Union of Mineworkers, interviewed by "Westgate," of the Western Mail.

Colliers who have spent years, perhaps a lifetime, in one pit, working alongside the same "butties" are bound to have misgivings about moving to new surroundings, even though they are not far away. If future transfers demand that a miner should actually move house, he will wonder who is to foot the bill. Unlike a factory, the coal face cannot be sited to suit those who work there.—Western Mail.

The canals have two powerful unscrupulous enemies against them—the National Coal Board and British Transport Commission. The first only wants the water and does not care what happens to the canal. The second does not appear to want either, but fools the public into thinking the canals have a future when in reality it wants to be rid of most of them—Letter in the Stoke-on-Trent Sentinel.

The coal industry—and that means the miners as well as the National Coal Board—is not in a good position at the present time to put up its prices.—Nottingham Guardian Journal.

If the men needed can be retained in or attracted to the [coal] industry only by assurances of steady employment in this or any other industry assurances will have to be given and means of implementation devised.—The Journal, Newcastle-upon-Tyne.

You cannot assess the harm strikes do to the country merely by averaging the hours lost by strikes over a year. It is the incidence of a strike in a given industry at a given time that does the harm.—Sheffield Telegraph.

Nobody is likely to underestimate the complexities of wage determination, but it is becoming increasingly clear that the present mixture of anarchy, bluff, and opportunism, seasoned by the occasional strike, is unsatisfactory from the national point of view and unfair to many of the members the TUC represents.—Financial Times.

There are always two sides to a dispute. There are black sheep in every fold. But there never was a time when the employers gave closer attention to industrial relations than at present.—SIR GEORGE POLLOCK, *director of the British Employers' Confederation.*

Perhaps the target of tomorrow's standard should be an equation of state, or, perhaps, equations of state. Into an equation of this nature will go the molecular and atomic parameters of a given composition of matter. Ideally, out of it will come the precise strength at a given temperature, at a given loading rate; the dielectric properties at a given frequency; the thermal properties and other data necessary to complete definition of the engineering behaviour of the material. The target is a lofty one viewed from today's qualitative "materials science" platform. It is probably one of the most challenging technical problems which engineering has ever faced.—MR. C. A. HOCHWALT, addressing the annual meeting of the American Society for Testing Materials.

Many workers will deride the opinion of the Bishop of Carlisle that there is virtue in work as work . . . "Work" to the average man is that which he must do. Free to do so he would probably labour harder at a hobby; but that is not regarded as work because he can lay-off or go on as the mood moves him.—Newcastle-upon-Tyne Journal.

Lower Exports of Many Engineering Goods

FALLING trend of exports this year has been widespread throughout industry. This emerges clearly from the Board of Trade detailed figures for July. Recorded exports in the three months to the end of July averaged nearly £18,000,000 a month less than in the first four months of the year.

Engineering products as a whole accounted for more than half of the decline. Exports of machinery fell by an average monthly figure of £5,300,000 between the first four months of this year and the succeeding three. There has been a substantial decline in the rate of tractor exports and some slackening in machine tools. Electric generators, motors, transformers, switchgear and similar apparatus did particularly badly. Steel shipments were also down.

NEWMAN, HENDER & COMPANY, LIMITED—Future prospects, states Mr. Noel P. Newman, the chairman and managing director, are to a considerable extent dependent on the demand from the petroleum industry, which does not at present show any real sign of improvement. The acquisition of Sydney Smith & Sons (Nottingham), Limited, gives a wider coverage of the field of demand for valves and has improved efficiency within the group and Mr. Newman is confident that it can maintain its position of steady progress and development.

Guest Keen Reorganization

MR. C. R. WHEELER RESIGNS CHAIRMANSHIP TO JOIN AEI

BOARD of Guest Keen & Nettlefolds, Limited, announces that for administrative reasons the separate steel companies in the GKN group are to be amalgamated from January 2 next. To effect the amalgamation, Guest Keen Iron & Steel Company, Limited, will change its name on that date to G.K.N. Steel Company, Limited, and will acquire the undertakings and assets of Brymbo Steel Works, Limited, John Lysaght's Scunthorpe Works, Limited, and its subsidiary, the Scunthorpe Rod Mill, Limited, which companies will then be liquidated.

At the same time it is announced that Mr. Charles Reginald Wheeler, 56-year-old chairman of Guest Keen Iron & Steel Company, and one of the leading figures in the British steel industry, is relinquishing that post at the end of this year. He has been appointed an additional vice-chairman of Associated Electrical Industries, Limited, and will take up executive duties with AEI in 1962.

MR. C. R. WHEELER

An announcement by AEI says that, besides the additional vice-chairman, there will be changes in the AEI board. Viscount Head (formerly Mr. Antony Head, MP) has resigned as a result of his appointment as the first High Commissioner in the Federation of Nigeria, and Sir Joseph Latham, who retires as deputy chairman of the National Coal Board on Wednesday, has been elected to the AEI board.

Directors and Management

The statement regarding the amalgamation of the GKN group steel companies says that GKN Steel Company will, from January 2, 1961, operate through the following works: Brymbo Steel Works, at Brymbo, near Wrexham; Guest Keen Iron & Steel Works, at East Moors, Cardiff; and Lysaght's Scunthorpe Works, at Normanby Park, Scunthorpe.

Its board of directors will be:—Chairman, Mr. K. S. Peacock; deputy chairman and general managing director, Mr. H. W. A. Waring; managing directors, Mr. D. Bruce-Gardner and Mr. E. V. Callin (Lysaght's Scunthorpe Works); Mr. E. Davies (Brymbo Steel Works); and Mr. L. R. P. Pugh (Guest Keen Iron & Steel Works); while the other directors will be Mr. N. R. R. Brooke, Mr. R. P. Brookes, Sir John Green, Mr. Aubrey Jones, and Mr. E. C. Lysaght.

It is intended that the three works of GKN Steel Company will be operated under the same management as the existing separate companies, whose directors will become local directors of GKN Steel Company as follows: Brymbo Steel Works—Mr. H. W. A. Waring, Mr. D. Bruce-Gardner, Mr. E. Davies, Mr. P. H. Meadows, and Mr. L. R. P. Pugh; Guest Keen Iron & Steel Works—Mr. H. W. A. Waring, Mr. N. R. R. Brooke, Mr. D. Bruce-Gardner, Mr. E. Davies, Mr. S. W. Evans, Hon. R. G. Lyttelton, Mr. C. F. Pagnamenta, Mr. L. R. P. Pugh, Col. C. G. Traherne, and Mr. E. M. Yorath; and Lysaght's Scunthorpe Works—Mr. H. W. A. Waring, Mr. D. Bruce-Gardner, Mr. E. V. Callin, Mr. P. J. Cockram, Mr. E. Davies, and Mr. L. R. P. Pugh.

Mr. Waring will act as chairman of the local boards with Mr. Davies as managing director responsible for Brymbo Steel Works, Mr. Pugh as managing director responsible for Guest Keen Iron & Steel Works, and Mr. Bruce-Gardner and Mr. Callin as managing directors responsible for Lysaght's Scunthorpe Works.

The GKN announcement regarding Mr. Wheeler stated that he was relinquishing the chairmanship of Guest Keen Iron & Steel Company and his many other directorships and appointments with the GKN group "in view of his acceptance of another appointment," although he would remain a director of Guest Keen & Nettlefolds itself.

Mr. Wheeler, who entered the steel industry on leaving St. Paul's School in 1922, became chairman of Guest Keen Iron & Steel Company in December last, taking over from Mr. K. S. Peacock, who gave up the appointment owing to pressure of other commitments.

At the outbreak of the second world war, Mr. Wheeler joined the Iron and Steel Control, becoming Controller of Iron and Steel in 1944.

He returned to Guest Keen Baldwins Iron & Steel Company, Limited, in May, 1946, as joint managing director, and became a director of the Steel Company of Wales, Limited, on its formation in 1947.

He served as president of the Iron and Steel Institute in 1958-59 and is a member of the council and executive committee of the British Iron and Steel Federation. His many directorship include B.I.S.C. (Ore), Limited, G.K.N. Reinforcement, Limited, the Oxfordshire Ironstone Company, Limited, and the Tentor Bar Company, Limited, of all of which he is chairman; the British Iron & Steel Corporation, Limited, the British Steel Corporation, Limited, George Wimpey & Company, Limited, and Ore Carriers, Limited.

It is understood that Mr. Wheeler is not taking up executive duties with AEI until 1962 because he still has "duties" to the steel industry which make him unavailable for full-time work on the AEI board next year.

For reasons of health, Mr. Thomas Jolly, joint managing director of Guest Keen Iron & Steel, is to retire on January 1, 1961. He joined the board in 1943 and was appointed joint managing director five years after.

New Deputy Chairman for Scottish NCB

AT present industrial relations director of the Scottish Divisional Coal Board, Mr. L. R. Milligan has been appointed deputy chairman of the divisional board as from October 1, 1960. He will succeed Mr. William Smith, who is retiring at the end of next month.

MR. L. R. MILLIGAN

Born in 1902, Mr. Milligan started work at the age of 14 as a pitboy with the Garallan Coal Company, Limited, at Cumnock. He was then apprenticed with Hamilton & Brown, Glasgow, and in 1925 joined the planning staff of the Fife Coal Company, Limited. His first managership—at Woodend Colliery—came when he was 26 and later he was manager for a short time of Blairmuckhill Colliery. In 1939 he joined the Lochgelly Iron & Coal Company, being appointed assistant to the general mining manager in 1941 and general manager four years later.

Since vesting date, in addition to the period on the divisional board, Mr. Milligan has been deputy Area general manager and production manager in the old Fife and Clackmannan Area and Area general manager, first in the Alloa Area and later in the Lothians Area. He has held his present post since 1956.

He has served both as president of the National Association of Colliery Managers (1949) and of the Scottish branch of the NACM and is the present president of the Coal Trade Benevolent Association of Scotland. He is a member of the council of the Institution of Mining Engineers and of the Mining Institute of Scotland, a member of the Association of Mining Electrical and Mechanical Engineers, and the Safety in Mines Research (Advisory) Board. He was made OBE in 1950 in recognition of his services to the mining industry.

Mr. Smith has spent his whole life in mining, though not always in coal or in Scotland. He served his apprenticeship as a mining engineer with the Coltness Iron Company, Limited, Newmains, and then went to South America, where in Peru he managed copper and silver mines. On his return to Scotland he rejoined Coltness Iron in 1923 and served that company in many capacities, ultimately becoming agent in 1939 and general mining manager in 1944—the position he occupied when the industry was nationalized in 1947.

His appointment under the National Coal Board was first as a sub-Area production manager in the Central East Area of the Scottish Division and later in 1947 he was promoted Area general manager of the Area. He was appointed deputy chairman of the divisional board in April, 1952.

TELEPHONE NUMBER of the Chessington depot of British Insulated Callender's Cables, Limited, is now Chessington 3366/7/8.

Industrial Training of Boys "Inefficient"

TRAINING given to boys entering industry other than as apprentices is described by the Industrial Training Council as "slow, haphazard, inefficient and wasteful." The council's new booklet, Training Boys in Industry, asserts that the majority of non-apprentices get no systematic training at all, and a new approach is needed in industry. Companies which have introduced systematic training have benefited by increased efficiency, lower turnover of labour and improved industrial relations, and details of a sample 16 companies operating such schemes are given in the second half of the booklet.

Ministry of Labour figures are cited showing that only about a third of the boys entering employment below the age of 18 take up apprenticeships. A half enter other occupations for which there is usually no organized tuition. On a wider view, something like two thirds of the total number of workpeople are in jobs traditionally regarded as "semi-skilled" or "unskilled," and this proportion will if anything rise, with the decline of traditional craft occupations.

Main essentials of training schemes as put by the council are: Organized general training about the employing company and its position; practical systematic training in the job; and further education at technical colleges, not only for semi-skilled workers, but also for many others to meet the increasing need for transference of workpeople from one job to another involving a degree of "mental flexibility." The council in fact recommends the extension of day-release facilities to all boys up to 18 for further education.

More Strikes—but Fewer Working Days are Lost

NUMBER of strikes this year continues to exceed the number during the corresponding period in 1959. Figures published on Wednesday by the Ministry of Labour show that between January and July there were 1,674 stoppages, 952 of them in coal-mining, involving 477,300 workers. In the first seven months of last year the figures were 1,250 and 438,300.

Working days lost so far in 1960 through industrial disputes total 1,752,000—well below the 4,404,000 lost in the same period of 1959. The number of strikes fell during July to 164, over 100 fewer than in the previous month. The numbers involved and the days lost were cut by nearly half. Of the strikes beginning during July over 60 per cent. were due to wage disputes, and about 30 per cent. to disagreements over working arrangements, rules, and discipline.

Further details were issued on Wednesday of average earnings in industry during the last week of April. In the main industrial classifications, men in metal manufacturing earned on average £15 16s., and those in engineering and electrical goods £14 14s. 2d. Highest earnings were in motor-car firms, where men were paid an average of £19 per week.

The Ministry also confirmed its figures for general earnings, first published last month. These were £14 16s. 4d. for men in manufacturing, and £14 2s. 1d. for men in industry as a whole. Both figures were the highest since the present records started in 1947.

Coal Shortage Feared

MINEWORKERS' WARNING ON MANPOWER LOSSES

PAY and conditions in coal mining were no longer competitive with those in other industries, said Mr. W. Paynter, general secretary of the National Union of Mineworkers, commenting on Thursday of last week on the 5s. a week award of the National Reference Tribunal. This, coupled with the man's sense of insecurity, was causing a drift away from the mines which could reduce the industry's labour force to 575,000 by the end of the year, 20,000 below the figure planned by the Coal Board. If men continued leaving at the present rate of 1,000 a week, the NUM executive feared there might be a shortage of domestic coal this winter.

Mr. Paynter was speaking after a meeting of the national executive of the union. He said that "extraordinary measures" were having to be taken in some coalfields to meet the shortage of miners. The board, he claimed, was considering closing some pits to bring others up to strength. "It could mean, if we had a very severe winter, that there might be a very serious position as far as supplies are concerned. A large proportion of the stocks now held are not suitable for domestic purposes."

Mr. S. Ford, president of the union, said that there was "grave dissatisfaction and disappointment" in the coalfields at the 5s. award. The executive had instructed the union's negotiators to consider the whole question of wages and report back in October.

The NUM is constitutionally bound to accept the award, but the negotiators may well recommend a new claim this autumn.

"Crisis Proportions"

The warning of a likely coal shortage was repeated by Mr. Abe Moffat, president of the Scottish Area of the NUM, at a delegate meeting on Monday. The manpower position, he said, had become so critical that the Scottish Divisional Coal Board was going to advertise for ex-miners to return to the pits.

The number of miners in Scotland is now down to 71,000—about 8,500 fewer than a year ago. A delegate stated that in the last three years 6,000 young men had left mining to join the Army; of these 1,000 were from Scotland.

The conference passed a resolution deploring the recent wage increase as one of the lowest offered to any trade union this year and pointing out that, unless drastic steps were taken to prevent the drift of manpower, another serious crisis would develop.

It was maintained that the only way the drift could be halted was to concede the union's demand for a seven-hour day, substantial increases in wages, three weeks' annual holiday and greater security. It was also decided to call for the banning of all overtime until the NCB conceded the union's demands.

In Glasgow, also on Monday, the Scottish executive of the Colliery Enginemen, Boilermen, and Tradesmen's Association called on the executive of the NUM to give notice of its intention to end compulsory arbitration as a means of resolving major issues between the board and the association. Mr. D. Kelly, general secretary, said the drift of craftsmen from the mines because of the pay position had now reached "crisis proportions." A special delegate conference would be held in Glasgow on September 14 to discuss the whole position, including the proposals to ban overtime, and NUM leaders are to be asked to convene a meeting of all the groups and sections of the union concerned with craftsmen with a view to formulating a unified policy on craftsmen's wages.

The Nottinghamshire Area of the NUM has also drawn attention to the manpower shortage. Following a meeting of the executive council on Saturday the Area secretary, Mr. Albert Martin, said that in addition to the falling off in manpower there were also likely to be difficulties in the Midlands because of railway wagon shortages.

Mr. J. Tighe, president of the Nottinghamshire Area of the National Union of Mineworkers, said last weekend that it was "almost inevitable" that in the very near future another wage claim would be submitted.

NCB Assurance on Winter Supplies

THE National Coal Board on Tuesday, stating that it wished to correct any impression that there might be a shortage of house coal during the coming winter, said: "Merchants' stocks of house coal at over 1,000,000 tons are about at the level expected for the time of the year, having regard to recent colliery holidays. The board's own stocks of coal suitable for domestic use are in the region of 1,500,000 tons.

"As the collieries get into their stride again after their annual holidays and with the fullest co-operation of the distributive trade, as the board is entitled to expect, merchants' stocks of house coal will be in excess of 2,000,000 tons by the end of October, and the board's undistributed stocks over 1,500,000 tons." At the turn of the year the total stocks should exceed 3,000,000 tons.

"This, together with current output from the pits—which recent statements appear to have ignored—is adequate to meet the peak winter demand. The board's concern is solely that staffing difficulties on the railways could lead to difficulties in moving coal during the winter. Steps have been taken with the British Transport Commission to adjust supplies of coal between the several methods of transport in order to prevent or minimize these difficulties.

"The trade and consumers are urged to take as much coal into stock as they can before the winter."

Members of the Coal Consumers' Councils warned three weeks ago that a combination of railway staff shortages and severe weather might delay the distribution of coal this winter.

Wellington Tube Bid for Gibbons (Dudley)

OFFER of 120s. cash per share for the 401,240 issued £1 ordinary shares of Gibbons (Dudley), Limited, manufacturers of refractories and coal carbonizing plants, of Dudley (Worcs), is to be made by Wellington Tube Holdings, Limited. The offer will be recommended by the Gibbons (Dudley) board.

An offer for Gibbons has already been made by the Wellman Smith Owen Engineering Corporation, Limited, of 230s. cash plus one Wellman share for four Gibbons shares. At Wednesday's closing price for Wellman of 160s., this valued each Gibbons share at 97s. 6d. Wellman's offer, which was direct to holders, as no agreement was reached in discussions with the Gibbons' board, was due to be sent out at the end of this week.

A joint announcement by Wellington Tube and Gibbons (Dudley) states that the board of Gibbons will continue in office as at present, but there will be an interchange of directors. The position of the staff and employees will remain unchanged. Wellington Tube and Gibbons (Dudley), it is stated, have common interests in future technical developments on the engineering side of their respective businesses.

The announcement adds that an approach was made by Wellington to Gibbons at a time when discussions were already taking place between Gibbons and Wellman Smith Owen, and in view of this, Gibbons and Wellington agreed that negotiations between them could not then be opened. Subsequently Wellman announced the terms of its offer, which the directors of Gibbons considered inadequate, and "therefore felt themselves free to negotiate with Wellington."

Sheepbridge Engineering Order-book Heaviest for Four Years

WORK in hand at March 31, 1960, was more than at any time in the previous four years, states Lord Aberconway, chairman of Sheepbridge Engineering, Limited, colliery mechanical and electrical engineers, of Chesterfield. The increased industrial activity in 1959-60 benefited the company, and although there was a fall in demand for some products, there was an overall increase and a greater value of goods delivered than in any previous year.

All the subsidiary companies participated in the increased industrial activity. However, Sheepbridge Equipment, Limited, despite an increased demand for many of its products, suffered a setback in the sales of mining equipment through the pruning of capital expenditure programmes by the National Coal Board. Strenuous efforts were being made to find suitable work to enable the department normally engaged on the production of mining equipment to operate to full capacity.

Sales of all the other subsidiary companies were higher than in the previous year, record sales being achieved by Sheepbridge Stokes, Limited, Sintered Products, Limited, Bray Construction Equipment, Limited, Light Production, Limited, Twiflex Couplings, Limited, and Advance Motor Supplies, Limited.

The directors have thought it wise to extend the group's manufacturing capacity to meet the prospective increase in demand for many of its products. Additional capital expenditure is planned.

"Full Inquiry" Sought Into Machine-tool Industry

RENEWED pressure is to be placed on the Government by the Trades Union Congress for a "full and independent inquiry" into the machine-tool industry. Trades unionists are reported dissatisfied with its performance in the supply of machines to British industry and feel it should be making a larger contribution to the export trade. The subject is expected to be raised at the TUC Congress in Douglas next month on the annual report, published on Tuesday, which devotes much space to the critical attitude adopted by the trade union movement towards the industry.

The General Council does not regard the industry's progress as adequate, particularly in export performance, in research and development effort, and in training facilities. It complains that recently Lord Hailsham, Minister for Science, refused to make available to organizations represented on the National Production Advisory Council for Industry, a summary of the conclusions of the report made by the Department of Scientific and Industrial Research on the machine-tool industry.

Further "cause for anxiety" about the competitive state of the industry was occasioned when the Melman report on productivity in the machine-tool industries of Western Europe and Russia was issued by OEEC. Although the Government has appointed a sub-committee of the Machine Tools Advisory Council of the Board of Trade to investigate technical aspects of the Melman report, its terms of reference are considered inadequate. Instead, a full inquiry is sought to consider Prof. Melman's report, and one prepared by Dr. D. F. Galloway, which suggests that the machine-tool industries in Russia and Western Europe are forging ahead of that in the UK.

The right of trade unions to call strikes in nationalized industries and public services, even when their dissatisfaction results from Government action, is insisted upon in the report. "If Government control or interference adversely affects the workpeople in an industry or service," it states, "then trade unions must insist on their freedom to protect their members without being accused of using industrial action for political purposes, or directing it irresponsibly against the community."

This is the outstanding conclusion from a study of alleged ministerial intervention in collective bargaining, which arose out of a resolution passed at the 1958 congress.

The report states that there was some support for settling pay in all public industries by comparison with pay in other industries, as railway pay was settled this year on the basis of the Guillebaud report, but on the whole the General Council is against making this a general practice. Most unions, though not all, expressed dissatisfaction with their wages, but "those who were dissatisfied did not indicate what they would regard as reasonable wages and conditions, or how these could be secured."

ITALY'S STEEL INDUSTRY reached peak capacity in June with an output of 690,000 metric tons. Output of raw steel for the first six months of the year, at 4,110,000 tons, was 30.3 per cent. greater than in the corresponding period of 1959, while the output of rolled goods was 46.2 per cent. higher than the 1959 figure at 3,280,000 tons.

Obituary

LORD WEEKS

From Mining Engineering to Vickers' Chairmanship

THE death occurred last weekend of Lt.-Gen. Lord Weeks, former chairman of Vickers, Limited, and a former Deputy Chief of the Imperial General Staff. He was 69. As well as being a director of Vickers, Lord Weeks at his death held a large number of important offices in business and industry, including the chairmanship of the Finance Corporation for Industry, and seats on the boards of Associated Electrical Industries, Limited, British Petroleum Company, Limited, Massey Ferguson Holdings, Limited, and Pilkington Bros. Limited.

Lord Weeks, formerly Sir Ronald Weeks, was born in Durham and began his working life as a mining engineer after gaining honours in science at Cambridge. He became an industrial chemist and in 1912 joined Pilkington Bros., the glass manufacturers. He was made a director in 1928, chairman of the executive directors in 1939.

He served in the 1914-18 war with the Rifle Brigade, gaining the DSO and MC and Bar. Director General of Arms and Equipment in the early part of the second world war, he bcame in 1942 Deputy Chief of the Imperial General Staff and with Sir Robert Sinclair drafted the report which led to the founding of the Royal Electrical and Mechanical Engineers. He was knighted in 1943.

It was in the post-war period that Lord Weeks' principal services to British industry were made. He left the Army in 1945, joining in that year the boards of Vickers and the Finance Corporation for Industry. In 1946 he became deputy chairman of Vickers, and chairman in 1948. He retired from the chairmanship in 1956, but remained a director of the company. In industry he consistently advocated the seeking of recruits from higher education. He played a powerful part in the development of such firms as the Massey-Ferguson organization (UK), Associated Electrical Industries, and other companies. He was also an active member of the Council for Education in Industry.

LORD ADAMS OF ENNERDALE

SEVENTH son of a Cumberland iron-ore miner, John Jackson Adams, who became first Baron of Ennerdale, died on Tuesday at his home in Workington. He began his working life as an agricultural worker, later becoming an iron-ore miner.

He had a passionate interest in the welfare of Cumberland and its people and as director and general manager of the West Cumberland Industrial Development Company, Limited, and secretary of the Cumberland Development Council he played a major role in building factories for more than 50 new industries in the area, employing 48,000 people.

Lord Adams was a member of the Northern Gas Board, and from 1950 to 1954 a part-time director of the Northern (N & C) Divisional Coal Board. A fortnight ago it was announced that a Lord Adams Fellowship is to be set up at King's College, Newcastle-upon-Tyne.

Mr. C. F. DUTTON

DEATH occurred on Monday of Mr. Charles Frederick Dutton. He was 67. Mr. Dutton joined the commercial department of Powell Duffryn in 1909. After serving in the first world war, as a company commander in the South Wales Borderers during which he won the MC and Bar, he returned to his old company, eventually becoming by-products sales manager.

He joined the National Coal Board as assistant director of marketing (by-products) when the coal industry was nationalized, retiring from that position on January 31 last. During his working life Mr. Dutton took a prominent part in the affairs of the various by-products associations. He was president of the Association of Tar Distillers in 1957-58, a vice-president of the British Sulphate of Ammonia Federation, and a member of the executive and finance committees of the British Tar Confederation and of the British Road Tar Association.

Mr. JAMES THOMAS DANIELS, who was manager of Landgate Colliery, Wigan, from 1936 until his retirement last year, has died at the age of 66. He had been associated with collieries in the Wigan area for 52 years.

The death has occurred of Mr. MATTHEW ELLISON, chief electrical engineer of the No. 5 (Mid-west Durham) Area, Durham Divisional Coal Board. He was 56. Mr. Ellison joined Pease & Partners, Limited, the Darlington colliery owners, 20 years ago after being connected with several electrical concerns. On vesting date he was appointed a group electrical engineer for the Mid-west Durham Area.

The death has occurred of Mr. WILLIAM THOMAS HOLLAND at the age of 76. He started work at Pemberton Colliery (Lancs) in 1896 and was appointed undermanager at the age of 23. After 20 years at Pemberton he transferred as undermanager to Maypole Colliery (Lancs). On his retirement in 1948, Mr. Holland established a timber business, supplying blocks for use in colliery underground workings.

Appointments

BICC's New Divisional Engineer

NEW chief engineer of the power cables division of British Insulated Callender's Cables, Limited. London, W.C.1, is Mr. J. Banks. He joined BICC from Liverpool University as a member of the chief engineer's department. In 1947 he was promoted head of the power cables laboratory of the company's Prescot factory and subsequently became power cables technical superintendent.

In 1951 Mr. Banks transferred to the research department and became responsible for power cable and accessory development. In recent years he has been concerned with the design and engineering of such important oversea projects as the extensive installations in Vancouver and the oil-filled cables at the Kariba Dam.

Mr. GEORGE SHARPE has been appointed general manager at the Worksop works of the Sheffield Twist Drill & Steel Company, Limited.

MR. FRANK WILSON has been appointed public relations officer for Whitlock Bros. Limited, agricultural and industrial engineers, of Yeldham (Essex).

DR. G. F. MACKENZIE, who has been Area medical officer of No. 7 (Wakefield) Area, has been appointed Area medical officer of No. 8 (Castleford) Area, North-Eastern Division, National Coal Board.

MR. E. H. BLACK, chief engineer of the Midlands division of the Marco Conveyor & Engineering Company, Limited, has been appointed chief engineer to the company. He will be based at the head office at Rowin works, Leytonstone, London, instead of at Birmingham as hitherto.

Mr. A. F. RICHARDSON has been appointed chief surveyor and minerals manager of the Warwickshire Area of the West Midlands Divisional Coal Board with effect from September 5. He has been divisional subsidence surveyor since 1957. Before joining the West Midlands Division he held various surveyor posts in the North-Eastern Division of the National Coal Board.

Mr. WILLIAM RONALD MILLS has joined Stanley Works (G.B.), Limited, makers of Stanley tools, of Sheffield, as general sales manager. He takes over from the sales director, Mr. Warwick M. Dingley, who has taken up the new appointment of director of marketing in Europe for the whole of the Stanley organization, although he remains on the board of the British company.

Mr. T. SANDERSON has been appointed planning engineer in the divisional reconstruction department, Doncaster, of the North-Eastern Divisional Coal Board. From 1945-1947 he was group planning officer for the Fountain & Burnley group of collieries. In 1947 he was appointed assistant Area planning engineer in the No. 6 (North Barnsley) Area, becoming in 1956 Area planning engineer.

West Midlands Divisional Coal Board has appointed Mr. J. E. STRACHAN production manager (planning) of the Warwickshire Area wtih effect from a date to be agreed. Since May, 1957, he has been project engineer in the Warwickshire Area with special responsibilities for reconstruction work at Arley and Haunchwood collieries and the Daw Mill sinking. Prior to that Mr. Strachan was manager of No. 4 Group in the Warwickshire Area.

Board Changes for Keighley Cranemakers

A NUMBER of board changes are announced by John Smith (Keighley), Limited, the crane manufacturing subsidiary of Thos. W. Ward, Limited, Sheffield. Mr. Frederick Johnson, a director of the associated company of Thomas Smith & Sons (Rodley), Limited, is to take over the position of managing director, as a director and general manager from September 1.

MR. F. JOHNSON

He succeeds Mr. G. A. Smith, managing director of the firm, who, on medical advice, has resigned his appointment. Mr. Smith will retain his seat on the board as a director in a consultative capacity. Mr. Charles Smith, a local director, has relinquished his appointment with the company and has retired owing to ill-health.

Mr. Cyril Bland, a local director, who has been associated with John Smith (Keighley) for many years as works manager, has been appointed to the full board, as has Mr. E. C. W. Swann, also a local director, who is actively engaged in the design and development of overhead cranes for the company.

Avoiding Redundancy Caused by Steel Conversion Scheme

EFFORTS to avoid redundancy at Steel, Peech & Tozer, branch of the United Steel Companies, Limited, through its £10,000,000 conversion to electric steelmaking, are meeting with difficulties because of the reluctance of older workers to accept other jobs. The conversion will be spread over five years and will mean about 900 fewer jobs. The firm's chief concern is to see that none of its longer service workers is affected by the change, and to ensure this it is advertising in the works jobs with eventual promotion prospects as they occur. It is estimated that there will be 200 of these in the five years.

Older men, however, are not applying because the new jobs frequently involve a drop in pay, and younger men are getting the jobs in default. The unions are faced with the task of persuading men to accept less money for the time being. The possibility of compensation money for loss of status is being considered by the firm to meet the problem, as is severance money. Some of the men may be able to find work elsewhere, particularly at Appleby-Frodingham Steel Company, another branch of United Steel, which expects to need another 1,000 men in the next three years.

DESPITE the current coal crisis, the Dutch national coal mining concern, Staatsmijnen, of Limburg, sold virtually all the coal and coke produced last year. The company's output for 1959 was 7,500,000 metric tons of coal and 2,800,000 tons of coke.

IRON AND STEEL TRADE

NEW plant coming into production and the ending of works holidays combine to begin the build-up to all-out production at blast furnaces, steelworks, and rolling mills. Every ton is likely to be needed for a considerable time to come and certainly for the next four months maximum outputs will be required to keep pace with the demand for structural steel and heavy sections, and beams and plates. The pressure for deliveries of most types of steel should enable all sections of the industry to achieve record output figures.

Pig-iron

Most of the engineering and speciality foundries find no appreciable easing in the call for castings, but there are some instances where the quantities of pig-iron now being specified show slight reductions on previous deliveries. Producers of the grades of pig-iron required by these foundries, including the low-phosphorus irons which are chiefly in demand, hematite, and refined irons, are able to satisfy current calls fairly easily.

Deliveries could be increased for practically all brands of these irons. Because of the fairly easy supply position which obtains, most foundries are content to specify for only those tonnages needed for consumption plus a small working stock and there is little forward buying.

Ferro-alloys

The price of ferro-tungsten is unchanged and the metal is receiving only slight attention, but ferro-molybdenum is fairly active. There is a steady call for ferro-vanadium, and ferro-silicon is in reasonable demand, but silicon metal is slow moving. Both the high and low carbon grades of ferro-chrome are in steady request, and calcium silicide is quite active. The demand for ferro-manganese and silico-manganese continues at a good level. Ferro-niobium and ferro-titanium receive moderate support.

Semi-finished Steel

Shortage of suitable labour prevents increased outputs from the re-rollers, the majority of whom have good order-books. A satisfactory demand is maintained for small bars, light sections, and reinforcing rods. Adequate supplies of steel semis are available and stocks of steel billets, blooms, etc., are in several cases heavier than they have been for some time.

Home steelworks are able to supply current demands in mild steels satisfactorily, but specialist re-rollers who require high carbon, silico-manganese, and other special grades of steel are not so happily placed for supplies and deliveries from home steelworks are well behind the demand.

Finished Steel

Demand for sections and joists continues to increase, with the result that many of the more popular sizes have almost disappeared from the mills' programme offers due to the heavy forward bookings. However, capacity is still available for some special sizes in forward and current programmes, although the position daily becomes more acute. Plates of all descriptions maintain their demand, and with makers well covered for some months ahead delivery dates, particularly for the lighter thicknesses, are being extended.

Placing of orders for cold-reduced sheets presents a big problem, as makers are already overloaded, but supplies from the Continent and America are easing the situation to some extent. Bright drawn bars in ordinary commercial qualities and cold-drawn strip are now easier to secure, but alloy and free-cutting bright drawn bars are scarce.

With production still below normal, makers of colliery requirements, such as pit props, arches, benk bars, light rails, etc., could do with further indents in order to step up production in both current and forward programmes.

Labour May Attack Llanelly Steel Sale

SHARP attack on the Government over the sale of the Llanelly Steel Company, Limited, to the Midlands engineering group of Duport, Limited, is expected when Parliament reassembles in October. Mr. James Griffiths, MP for Llanelly, last week tabled a question to the Chancellor of the Exchequer, Mr. Selwyn Lloyd, asking for a statement of the reason why and the terms on which the Iron and Steel Holding and Realization Agency sold the company.

Duport paid £1,750,000 for Llanelly Steel, whose book value, according to the Treasury, was £3,240,000 (including an investment programme of £2,160,000 spent by the Government since it was taken over in 1952 by the Agency in the process of denationalization).

Following strong representations and criticism that the sale was not divulged until after Parliament had risen for the summer recess, although the negotiations were completed on July 6, Mr. Anthony Barber, Economic Secretary to the Treasury, has replied to Mr. Frederick Lee, Labour's Shadow Minister of Labour. He explains that the sale was not completed until August 2, and it was at the request of Duport that no mention was made of it until the purchase was settled. The new owners had asked for secrecy on technical grounds, and also that publication of the sale should be deferred until after the end of their financial year on July 31.

Mr. Lee has rejected the Minister's explanation for the delay in announcing the sale, describing it as "a shocking and fantastic excuse." Mr. Griffiths, it is understood, will press for a full statement to Parliament at the end of October, and is also considering whether to force the issue to a debate.

Duport, which also owns the Briton Ferry Steel Company, Limited, has said it proposes integrating the general activities of both these companies to provide for the increased demand for steel within the group's holdings. Excellent prospects have been held out for Llanelly Steel which, according to the Treasury minute recording the sale, operated at a loss of £225,589 during 1958 and 1959.

Wellman Smith Owen's Record Trading Year

VOLUME of contracts now in hand in all sections of Wellman Smith Owen Engineering Corporation, Limited, makers of open-hearth and industrial furnaces, ancillary plant, etc., of London, S.W.1, amounts to over £9,000,000 and is now approaching peak figures, states the chairman, Sir Peter Roberts.

SIR PETER ROBERTS

There is still a considerable amount of work in prospect for the iron and steel industry, both at home and abroad, which should ensure a continued increase in the activities of all those connected with the company, he adds. Much of the new business is in connection with the major steelworks extensions in Great Britain.

Records were attained by the corporation during 1959-60 in turnover, and for the volume of contracts completed for both home and oversea. In addition to the numerous units of heavy plant and equipment manufactured for the UK steelworks, the volume of export business has been considerable.

The volume of business in the corporation's Ross Valve division continues to increase, and there is a marked expansion of the oversea demand for this product.

At the annual meeting on September 22 it will be proposed that directors' remuneration be increased and that borrowing powers be brought up to date. The new article will not increase the directors' borrowing powers.

FBI Conference on Recruitment in Small Firms

THREE-DAY conference on recruitment and training policy in small firms, organized by the Federation of British Industries, will be opened by Sir Norman Kipping, director-general of the federation, at Buxton (Derbyshire) on September 26. The conference is intended for chief executives of firms employing fewer than 1,000 people, and its purpose is to examine the recruitment and training problems faced by firms of this size and to find possible solutions.

Idea for the conference has grown from the realization among FBI members that the 23,000 small UK firms, which employ 39 per cent. of the country's industrial labour force, must step-up their drive for technological progress if they are to succeed against growing competition from oversea.

TOTAL of 2,500,000 metric tons of steel is expected to be produced in India this year, against 1,700,000 tons in 1959. Steel imports in 1960 are expected to total 600,000 tons, against 1,100,000 metric tons in 1959.

£2,000,000 Copper Project for New Zealand

COPPER manufacturing industry is to be established in New Zealand by Imperial Chemical Industries of Australia and New Zealand, Limited, (ICIANZ) and Yorkshire Imperial Metals, Limited, Leeds—in which ICI is an equal partner with the Yorkshire Copper Works, Limited. New Zealand at present imports all its copper manufactures and the new industry, involving a capital outlay of more than £2,000,000, will be based on imported ores. The net saving to the country in foreign exchange will be more than £500,000 a year.

Pressure from the New Zealand authorities to effect this saving is believed to be one of the reasons behind the move. Other factors are the prospect of rapid growth in the consumption of copper products, and the increasing competition from other exporters, especially from Australian and other UK companies. If the new plant takes the whole New Zealand market the loss to this country will be about £2,000,000 of direct exports a year, or about 4 per cent. of all copper exports.

Apart from refining copper the plant will also make copper alloy sheet, strip, and tube. It is expected that ICIANZ will form a subsidiary to conduct the manufacturing operations. Details of the capital structure are not available, but the parent companies state that 25 per cent. of the equity will be offered for public subscription in New Zealand. The New Zealand Government supports the project, which is still subject to ratification by the two boards and by the UK Capital Issues Committee and the Treasury.

Sunderland's First Scrap Cargo From US in Three Years

FIRST cargo of United States iron and steel scrap to arrive in the Wear for three years reached Sunderland South Docks last weekend. The cargo of 9,600 tons was brought from Philadelphia in the Panamanian steamer St. John. The scrap is destined for North-East steel mills.

General manager of the River Wear Commissioners, Mr. E. Lonsdale, said on Monday "We are hoping that this cargo marks the resumption of what was once a profitable trade for this port." At its peak in 1956, Sunderland handled 214,769 tons of scrap, but the quantity dropped away until last year not a single ton was imported. In 1957, the last year in which American scrap reached the Wear, 178,000 tons were discharged at the South Docks.

Arrival of the St. John was welcomed by Wear dockers, who gained a national reputation for the speedy turn-round of ships when the trade was running at its peak.

AGREEMENT to manufacture jointly under the trade name "Turbo-Cyclone" a wide range of plastics chemical plant and equipment, in addition to their present range of PVC fans, has been made by Matthews & Yates, Limited, fan engineers, of Swinton, Manchester, and Turner & Brown, Limited, chemical plant engineers, of Bolton. The agreement, it is stated, will produce the largest plastics chemical plant organization in the UK.

Economical Use of Power at Collieries

By M. V. KELLY*

Progress in fuel utilization and electrification at many collieries is far from satisfactory. Base load, steam-driven prime movers have now been replaced by electrically driven machines, making it difficult to operate boiler plant efficiently for the remaining requirements. In this paper, presented to the Yorkshire Branch of the National Association of Colliery Managers on March 8, 1960, the author emphasizes the need for the efficient utilization of all forms of power and outlines the methods which can be adopted for reducing or minimizing the cost of power, heat, and light.

POWER for producing coal for the market is one of the inevitable and basic requirements of the mining industry; the amount used is for ever increasing, and when it costs the North-Eastern Divisional Coal Board almost £10,000,000 annually, interest must be taken in its generation, purchase, and use. Before entering into the economies of power utilization, we should consider first just what sort of power is used at collieries, secondly, how much it costs us, and thirdly, how can we use it more economically or, alternatively, cut down its waste.

There are three main sources of power, namely, steam, electricity, and compressed air, with the relatively minor use of diesel fuel for locomotive traction and earth-moving equipment, with, no doubt, a future use of gas in the form of methane or producer gas.

Factors Influencing the Cost of Power, Heat, and Light

There are several items which go into the make up of our power, heat, and light costs, all of which are, no doubt, familiar; they consist briefly of the following monthly recorded items:—

Wages.—Under this heading should be included payments to boiler firemen, ashmen, pumpmen, coal emptying, ash handling, softener attendants, etc., together with those in power houses, switchboards, etc.

Purchased Power.—Nearly all of this is electricity, purchased from the supply authority, but also supplies from NCB power stations and interconnected colliery electricity generation.

Coal Consumed.—Mainly the consumption of coal on colliery boiler plants, but this should also include fuel used for space and water heating and fires, together with fuels used for locomotives.

Repairs and Renewals.—These should include all that has to be spent on keeping boilers and generators running. Such items as heavy boiler welding costs, tube renewals, renewing turbine blading, etc., add a substantial yearly sum to the total cost, but usually the entry fluctuates month by month.

General Stores.—These include all the stores used in running the generating plant, oils, greases, etc., but contain a big item in water softening materials.

Other Charges.—No doubt a final account to balance the total cost, but also includes steam, compressed air, or other services used for power purposes, supplied from other collieries or other undertakings, such as coke ovens.

Against all these items of cost, there are credits in the form of sales of power and lighting, etc., supplied as external demand to another colliery or any undertaking. These are all operational costs, and the power, heat, and light cost as recorded under these headings does not take into account the depreciation and interest on capital vested in the plant used for generation and utilization of power.

To place in true perspective the value of each of the previous sections, an up-to-date picture is given of the power, heat, and light cost in the North-Eastern Division for 1959.

Wide Variations in Costs

As no doubt can be expected, there are very wide variations in costs between Areas and collieries, and, in particular, will be noticed from Table 1 the critical differences in cost favouring the shallower, electrified collieries to the west side of the division and the heavy cost to be borne by the deeper, compressed-air using pits to the east. In the costs for Area 2, one can rightly deduct 7 per cent. from the total because of unavoidable power consumptions being incurred in pumping, etc., for Thorne Colliery, with no output to help the Area saleable tonnage, and in Area 4 the resale of electricity from Grimethorpe power station adds 10 per cent. to the Area's power, heat, and

* Chief engineer, North-Eastern Divisional Coal Board.

TABLE 1.—*Power, Heat, and Light Costs per Ton Saleable, by Areas, in the North-Eastern Division in* 1959.

Area.	Total cost.	Sales of power.	Net cost.
	s. d.	s. d.	s. d.
1	4 10.2	7 7	4 2.5
2	6 7.3	3 3	6 4
3	4 3.8	4 3	3 11.5
4	6 5.4	6 4	5 11
5	3 11.8	2 1	3 9.7
6	3 2.3	2 4	2 11.9
7	3 11.1	1 9	3 9.2
8	3 3.3	1 7	3 1.6
Div. average	4 8.6	3 8	4 4.8

light cost, which is recovered elsewhere. In fairly comparable high-power using collieries. differences are found from a minimum of 1s. 8d. per ton saleable to as high as 8s. 9d., and this, of course, is dictated by, among other things, the degree of power used, the cleanliness of the seams, the quality of preparation, the depths and inclinations of the seams, the amount of white dirt, and whether or not compressed air is used.

Computing costs to saleable tons makes any engineering study of statistics extremely difficult; far too often a temporary high power, heat, and light cost is due to the low tonnage wound as saleable coal.

If these costs are considered in their broadest sense (Table 2), it will be seen that a ton of coal

BLE 2.—*Breakdown of Power, Heat, and Light Costs per Ton Saleable, in the North-Eastern Division for* 1959.

	Cost per ton saleable.	Total amount.
	s. d.	£
Wages	6.1	1,057,168
Purchased power	1 10.4	3,916,544
Coal consumed..	2 0.5	4,279,048
Repairs and renewals	1.4	249,334
General stores	0.8	135,777
Other charges	1.4	242,741
Total	4 8.6	£9,880,612
Less sales of power	3.8	667,427
Net cost	4 4.8	£9,213,185

in the North-Eastern Division put into wagon or lorry used 4s. 4.8d. worth of power in its various processes from the face. Further examination reveals that the two major factors responsible for this cost are:—(1) Purchased power and (2) coal consumed. At the present time these two account for 83 per cent. of the total cost in almost equal proportions, and from what is left wages account for over one half. It is proposed, therefore, to deal with these two main cost items and the factors affecting them, because, obviously both are directly affected by the amount of power consumed and the cost of the basic constituents used to produce that power. In order to verify the trend in power consumption, an analysis is made of the use over the past five years in this division, and, without question, there has been a progressive rate of increase in the amount of power used per ton of saleable output, and one which must be expected with increases in mechanization and the need to supply cleaner coal for the market (Table 3).

TABLE 3.—*Comparisons of Power Used per Annum from* 1955 *to* 1959 *in the North-Eastern Division.*

Year.	Units of electricity purchased.	Tons of coal to boilers.	Average price per ton. s. d.	Calorific value. BTU	Saleable tons.
1955	524,214,095	2,115,639	48 9.3	10,970	45,510,316
1956	603,561,293	1,992,772	53 10.5	10,537	43,221,631
1957	661,522,973	1,778,253	58 0.4	11,021	43,328,459
1958	701,253,267	1,602,523	61 8.5	11,036	43,043,076
1959	752,467,919	1,402,366	61 0	11,052	41,546,000

It will be noticed that over this period of five years, the number of kWh of electricity purchased from the supply authorities is increasing at a rate of 50,000,000 units per annum, but the amount of coal consumed on boilers has only dropped by 160,000 tons each year, and yet its price per ton has risen 14s. in four years with adverse effect on the electricity savings.

Also from these figures it can be proved that the amount of power used to produce a ton of saleable coal is rising year by year. The coal used at its given calorific value can be converted to kWh, and if the purchased power is added to this figure the total kWh for the comparable years is given. In 1955, 38.3 kWh/ton saleable were consumed; in 1956, 39.7; 1957, 41.1; 1958, 43.7; and in 1959, 44.2.

Some people take the view that electrification will inevitably reduce the total power, heat, and light cost in the mining industry, but so far this has not happened in actual practice in the North-Eastern Division, but if we had not embarked upon a programme of electrification, then the cost would have been much higher than it is today.

It must be concluded that the increased efficiency of utilization and generation has kept pace with the ever-increasing cost and use, and how this has been achieved can be explained by:—(1) We are using more electricity and less compressed air; (2) purchasing more electricity and generating less; (3) the steam we generate is done so more efficiently; (4) power factors and load factors have been improved.

We are not being helped by the ever-increasing numbers of plant items added to the collieries every year, and from an analysis over the last six years it is found that each year in the North-Eastern Division 15 diesel locomotives underground are added to the existing large number and also three battery locomotives. We install 1,200 more electric motors (totalling 34,000 h.p.), and use 50,000,000 units of electricity more each year, but, unfortunately, only decrease our annual numbers of compressed-air motors by 350 (totalling 2,300 h.p.), and one can only guess whether the future increases in power use will be compensated by further increases in efficiency. We think we can for at least another year, but the economies so far effected by purchasing electricity from the supply authorities are already being discounted by increases in tariff charges commencing this year. The problem now seems to be one of (*a*) utilizing power more efficiently and (*b*) cheeseparing power

production costs, because modern mining must demand more and more power every year.

Boiler plant itself must be considered for the first improvements in efficiency and the hard fact must be faced that the tons of coal consumed, plus the price per ton, is almost the whole cost of producing steam, so we must ensure its most efficient combustion. At least 90 per cent. of the causes of poor combustion can be attributed to the draught conditions; tests by the divisional mobile test unit have proved this many times, and such happenings as flues choked up with flue dust, collapsed brickwork, warped dampers and frames are not infrequent. Cases are known where accumulations of flue dust over six weeks' operations have reduced efficiencies by 8 per cent. The inside of a boiler should be kept clean, as heat transfer losses in the order of 8 to 9 per cent. can be caused by $\frac{1}{8}$ in. of scale. It is quite surprising to find that many of our boiler plants, even today, are working with the economizer by-pass dampers open or partly open, and it may be that general draught conditions are poor, probably caused by indiscriminate additions of boilers to the ranges in the past, without altering the flues and chimneys accordingly, or that loads have increased with the consequent increase in the products of combustion, but more often than not it is due to neglectful operation, because someone opens the dampers at periods of low load or change of shift to prevent a high rise in temperature in the economizers, and so they remain open because no-one remembers to close them again when the load comes on.

In this division there are still some 510 boilers, of which 208 are hand-fired and the remainder equipped with mechanical stokers. These boilers consumed 1,402,366 tons of coal in 1959 at an average price of 61s./ton. The price range throughout the division varies tremendously and is from 24s. 6d./ton to as high as 95s./ton, and, in consequence, the power, heat, and light cost has to suffer many times because of marketing department requirements, transfers of coal from neighbouring collieries with freight charges added are quite common, and the using up of spoilt coal from coal-preparation plants is frequent. However, the major factor influencing the quality of fuel used is the steam loading on the boilers. Fig. 1 shows the heavy peak demands and the bad shift load factors.

To be conscious of load conditions, with frequent checks to see if a lower value fuel can be used, and particularly to cut out losses and the use of high-grade coals at nights and weekends can pay sure dividends.

Generally speaking, engineers are not encouraged to keep sufficient information and carry out tests to indicate whether their plant is operating efficiently. Operating logs and maintenance schedules are a "must," but every engineer in charge should know at any time: "How many pounds of steam am I getting for burning so many pounds of coal and at what cost."

The next question follows: "What happens to the steam after generation?", and certain factors for our concern arise:—(1) Wastage; (2) efficiency in utilization, and (3) the load. With regard to wastage, the visible steam leakages are generally remedied, most probably because they are an obvious source of waste, and also a nuisance, but how quickly and systematically do we cover open pipes by lagging, or by fitting steam traps to drains. One of our biggest forms of wastage is the incorrect use of live steam for space heating, where widely scattered buildings are continuously heated for 24 hr. per day and every day, by buried, unlagged steam pipes at boiler pressure, with no heat recovery from the wasted condensate. Tests have been carried out on several collieries for this source of loss and cases have been found where 10,000 lb. of steam/hr. at 120 lb./sq. in. pressure has been used to effect heating values requiring only 2,000 lb./hr. if correctly used.

A rule has been made that in all totally electrified collieries, there should be a common boiler

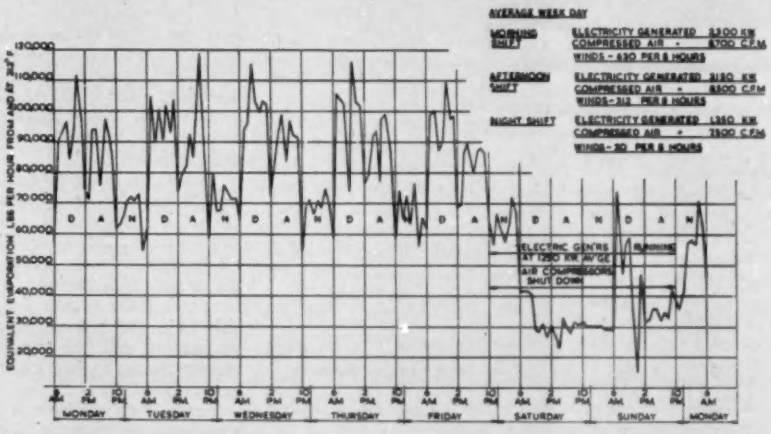

FIG. 1.—TYPICAL WEEKLY COLLIERY STEAM LOAD FOR 11 BOILERS CONSUMING 2,571,184 LB. OF FUEL AND EVAPORATING 11,324,180 LB. OF WATER, GIVING AN ACTUAL WATER/FUEL RATIO OF 4.4 LB./LB.

plant for pithead baths, and surface heating, with serious consideration to pumped hot-water systems thermostatically controlled for general heating. Transmission of steam is inefficient except for short distances.

Under efficiency in utilization most steam engines and turbines, although many are very old, are in sound mechanical condition, but often they are not operated efficiently. It is not unknown to see exhaust steam blowing to atmosphere, due possibly to accumulators having restricted nozzle areas, too high a water level, or due to bad governing and loading of mixed pressure turbines.

Under the most important question of load, we often have to run plant for duty far beyond the normal load capacity in order to deal with cyclic peak loadings. A colliery steam load factor is usually very bad indeed, as we tend to crowd our maximum base loads on to one shift, and then further strain the plant by adding peak loads at intervals throughout that shift, followed by lengthy periods during back shift and weekends on very light load conditions.

When the power used at a colliery comes solely from an outside electricity supply authority, we can forget the inefficiencies of steam generation, but in its stead there are many factors of extreme importance to consider if we are to obtain the full benefit of this purchase. Firstly, I would strongly commend to your notice an appreciation of the Electricity Board's industrial tariff and point out that inadvertent action taken without a keen understanding of its operation can cost a colliery a large sum of money.

Under the Yorkshire Electricity Board there is a two-part tariff based on (1) maximum demand and (2) unit charge, and covered by a year's accounting period to the nearest meter reading.

The industrial tariff was revised last year and in Table 4 the comparison is made between old and new tariff charges and its effect with an average colliery load given as 4,500 kVA maximum demand, and one where there are only steam winders but also electric compressors, etc. The emphasis on maximum demand charges and what happens to those kVA over 500 can be clearly seen.

TABLE 4.—*Comparison at Colliery "B" Between Annual Charges at Old and New Tariffs for Electricity Supplied by the Yorkshire Electricity Board.*

	Old rate per kVA.	New rate per kVA.	Old tariff	New tariff
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
First 100 kVA of max. demand	4 15 0	5 7 0	475 0 0	535 0 0
Next 150 kVA of max. demand	4 10 0	5 2 0	675 0 0	765 0 0
Next 250 kVA of max. demand	4 5 0	4 17 0	1,062 0 0	1,212 10 0
Balance 4,000 kVA. of max. demand	4 2 6	4 14 6	16,500 0 0	18,900 0 0
Unit charge: 13,500,000 at ..	0.675d.	0.65d.	37,968 15 0	36,562 10 0
Coal variation: 13,500,000 units at	0.1014d.	0.0924d.	5,703 15 0	5,197 10 0
Total	—	—	62,384 10 0	63,172 10 0
Average price per unit	—	—	1.1090d.	1.1230d.

The maximum demand charge is based on the highest figure recorded on the maximum demand indicator for any period of half-an-hour during the year or month whichever period is agreed upon, and charges accruing are based on increments of 100 to 150 kVA up to a maximum of 500 kVA of maximum demand, but notice that for every kVA of maximum demand over 500 kVA, we have to pay £4 14s. 6d. per annum or 9s. 6d. on a monthly demand.

The unit charge is obviously a charge for the units consumed, and it is not just a fixed charge per unit consumed but a progressive one based on units supplied in any month per kVA of maximum demand in that month, and charged at varying rates up to 350 units per kVA maximum demand and any in excess of this number of units is charged at 0.525d. The decision as to whether an annual or monthly account is agreed upon is very important because if a colliery load can be firmly fixed for some years ahead, then the annual charge is better because one can keep the peak loads within the maximum demand fixed. If the load is on the increase, due, for example, to reconstruction or electrification of the colliery, then obviously the monthly account is to advantage.

In simple terms we should aim to use the highest number of units for the lowest possible maximum demand, but quite often the maximum demand charge is pushed up to a very high figure for an exceedingly short period, but enough to influence the demand indicator, with the result that the whole year's maximum demand charge is based on this one incident. An example of this can be quoted of an actual incident at a colliery in the North-Eastern Division, where a policy change at the pit resulted in £2,887 yearly increase on the electricity bill.

Much is heard about power factor and this factor is not taken seriously enough; a low power factor imposes a heavy burden on everything that has to carry the current, and the current taken for any given load varies inversely as the power factor. The industrial tariff charges are formulated such that the consumer who takes power at a low power factor, pays much more for the energy he uses; there are many forms of corrections and without question, the cost of any of them can be recovered in two years because, in effect, they reduce the maximum demand for the same unit consumption.

There has been a drive in this division to install power factor correction devices, but a much greater effort is needed to complete this most simple installation. Many collieries are today working on power factors as low as 0.7. particularly at the smaller collieries. The savings to be effected by raising the power factor to 0.95 are not inconsiderable and actual examples in this division show savings of 1d. per ton from one pit having a 0.8 power factor to just over 2d. for another with 0.66 power factor.

Table 5 shows how a colliery can achieve a low average cost per unit of purchased electricity by

TABLE 5.—*Colliery Electrical Consumptions Showing Effect of Load Factor, Power Factor, and Other Items on Cost per Unit.*

	Load factor, per cent.	Max. demand, kVA.	Cost per unit (pence).	Annual units (millions).	Units per kVA max. demand	Power factor.
AREA 1.						
Colliery "A"	62.1	3,960	0.978	16.8	353	0.8
Colliery "B"	37.8	1,150	1.27	2.73	198	0.8
AREA 2.						
Colliery "A"	43.3	1,160	1.178	3.7	242	0.79
Colliery "B"	28.7	1,800	1.45	2.8	133	0.66
AREA 3.						
Colliery "A"	52.5	6,242	1.01	27.0	360	0.97
Colliery "B"	35.3	2,400	1.17	6.02	209	0.82
AREA 4.						
Colliery "A"	52.2	2,800	1.005	10.1	302	0.95
Colliery "B"	39.0	3,400	1.006	10.2	249	0.9
AREA 5.						
Colliery "A"	27.5	800	1.44	1.3	136	0.75
Colliery "B"	64.4	600	0.987	2.46	342	0.78
AREA 6.						
Colliery "A"	49.1	2,060	1.08	6.52	264	0.8
Colliery "B"	39.5	3,450	1.22	8.65	209	0.78
AREA 7.						
Colliery "A"	52.3	4,000	0.998	16.3	340	0.92
Colliery "B"	29.0	1,110	1.24	2.5	187	0.9
AREA 8.						
Colliery "A"	68.0	1,380	0.924	5.0	304	0.77
Colliery "B"	30.3	1,340	1.34	4.6	169	0.79

careful management of the load. It can be clearly seen that in every Area, those collieries with the highest load factor, consuming large numbers of units per kVA maximum demand, together with high power factors, can show substantial savings in the average cost per unit. Note also how collieries "A" in Areas 1 and 8 achieve their high load factor because of the supplies taken by adjacent coke ovens.

Purchased power in the North-Eastern Division cost £4,000,000 in 1959; over £100,000 more than in the previous year, and yet the effect of the recent tariff charge increases will not be felt until the end of this year, so even at this moment we should all aim to put our electrical house in order. With ever-increasing loads due to mechanization, especially the high-horsepower power-loading equipment which cause excess peak loadings, the best results will definitely depend upon continuous operation of the equipment at its rated speed. Power interruptions and low voltage cannot be tolerated.

There are always line losses in a most perfect distribution system; few appreciate that when the load on the system is increased, the line losses vary as the square of the load, not at the same rate. Larger horsepowers for machines at the face mean larger cables to the point where operators complain of weight, so the voltage must inevitably be raised, and 1,100 volts at the face will now have to receive serious consideration.

The outstanding value of electricity is its consistent and uniform high efficiency with all types of plant, but all one can say of compressed air is its inefficiency and lack of uniformity between different collieries.

It takes a 600-h.p. motor to drive a 3,000 cu. ft./min. compressor at 80 lb./sq. in. at the face; 1,000 cu. ft./min. is consumed to drive a 50-h.p. coal-cutter motor; so that on this basis we are using something like 600 h.p. to provide 150 h.p. Economically there is no doubt that the use of compressed air is a considerable burden on the mining industry, and while the machinery manufacturers have made considerable improvements in the design of air-compressing plant since the war, we have to consider the efficiency of the compressed-air system as a whole and take into account the distribution efficiency. The load factor, or ratio between the total load over 24 hr. and the full rated capacity of the plant, plays a greater role in the economy of a compressed-air system than in an electrical system because the loss due to leakage is constant no matter what the load. Again, the generation efficiences become appreciably lower as the load factor decreases.

These losses reach great importance in the efficiency of the system as the load falls off, and although we must always strive for a good load factor, the uniformity of the load during the working period is of even greater significance. This means that we must arrange individual compressor loadings to be as near full rated output as possible.

In this division the compressed-air problem is especially serious as at some pits it accounts for as much as 50 per cent. of the power, heat, and light cost.

Loss Due to Leakage

Loss in transmission by leakage is obviously one of the major factors affecting the overall efficiency and varies according to size and length of air mains, type of joint, and on the standard of maintenance. From tests taken at several collieries, it was found that the loss due to leakage varied between 8 and 30 per cent. according to conditions, and it must be remembered that this is quite often a constant loss for at least 144 hr./week. A 30 per cent. loss seems to be very bad indeed, and it obviously takes into account the losses up to the stop valve on the machine which would include losses in the flexible hoses—and it is here that most losses take place. Obviously periodic checks are advisable, and to do so arrangements should be made for fitting a by-pass meter at the district pit-bottom valves so that with the valve closed the loss in each district can be measured.

Loss due to pressure drop is another important factor; this usually only comes to light when reduced pressure at the face begins to affect the normal running of the machines. Most compressed-air machines are designed to give their rated horsepower at about 50 lb./sq. in. so that before the stage is reached where face machinery is affected, a considerable loss is taking place. It must be ensured, therefore, that air mains are of adequate size, and there should be close collaboration between the mechanical engineering department and those responsible for planning, mechanization, and management so that the air mains are always installed of the correct size to meet the face requirements.

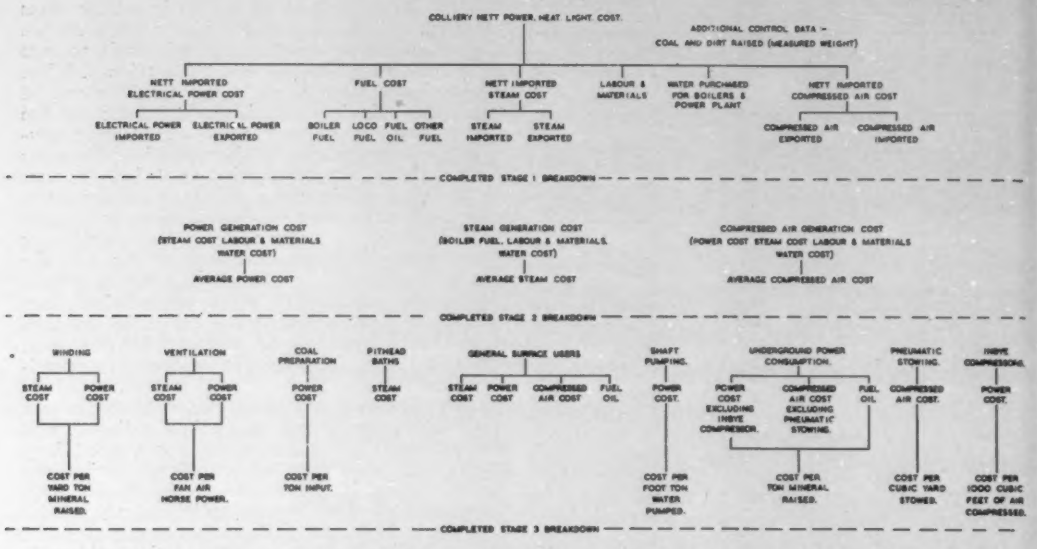

FIG. 2.—DIAGRAM SHOWING PROPOSED STAGES IN THE IMPLEMENTATION OF THE COMPLETE POWER, HEAT, LIGHT COST CONTROL SCHEME.

Compressed air could be a good second to electricity if greater attention were paid to its transmission and utilization; generation is now highly efficient compared with some older machines, and overall efficiencies of 68 to 71 per cent. are being obtained even with very large turbo-compressors, and total efficiencies (including distribution), up to 40 per cent. could be obtained.

Leakage losses and badly worn engines contribute to most of the wastage. If all the maintenance given to electrical systems to comply with safety and health were given to leakage prevention and engine overhauls with compressed air, then there would be a different tale to tell. All pits are powered with electricity and yet compressed haulages well away from the face are still perpetuated. Most of them are large, working most inefficiently without cut off gear, there is only one answer—replace them by electric drives as soon as possible.

Cost of Compressed Air

Many would like to get away from compressed air as soon as possible because it is an inefficient source of power, but if we must have it, it is surely important that we should control its use most carefully. It is a great pity that leakage of compressed air does not affect the safety of the system as electricity. All compressed air generated at collieries should be metered at the surface so that we can see how much is being used and then look around to see if that figure can be reduced. If the amount of compressed air being generated is known, especially by electricity, the cost to generate per 1,000 cu. ft. can be calculated. When an appreciation of what it is costing is made, then we shall see a serious attempt to reduce its use to the absolute minimum.

Power Production from Methane

Although general opinion favours putting methane into main gas grids, or perhaps under oven firing on coke ovens, there are collieries, neither near gas grids, or adjacent to coking plants, where this gas must be burned off on the surface to obtain the advantage of removing gas from the face.

This gas is extremely valuable as a source of local power and very few realize the potential value or the qualities involved. This division has at least eight large collieries which can be reasonably expected to have methane drainage systems producing between 350 and 750 cu. ft./min. with an average CH_4 purity of 65 per cent. and, what is also very important, an approximate life of yield varying between 15 to 40 years. There are many more possible sources and one could confidently estimate a divisional total of 6,000 cu. ft./min. for over 15 years.

The nett calorific value of this methane is approximately 890 BThU/cu. ft., and by feeding dual-fuel engines, *i.e.*, reciprocating gas engines, using diesel fuel for starting and load balance, electricity can be generated for as low as between 0.21d. to 0.35d., depending upon the size of the engine. Under these conditions, 400 cu. ft./min. will produce approximately 3,500 h.p. or at 150 cu. ft./min., 1,200 h.p. If used for local generation of electricity, providing a full load for generators can be maintained, then the methane can be worth at least 9d. a therm to us.

Conclusions

Electrification does pay; it can be switched off when it is not wanted, but with boiler plant at a colliery, however efficient the plant, high losses are suffered due to condensate loss by running machinery, especially turbines, on light load, losses from steam pipes, boilers, and engines even when they are well lagged, losses in exhaust steam, boiler blowdown and blow off losses, and some of those losses are going on for 168 hr. a week. In addition, men are being used on boilers and softeners and as powerhouse attendants when they could be more usefully employed on production. But we are going to have boiler plants at some collieries for years to come. It therefore behoves us all to run them as efficiently as possible. Trained men are required and expert supervision is needed, and we must have metering equipment for the feed water to give the figures of lb. steam per lb. fuel. From these figures, the cost per 1,000 lb. of steam can be calculated which, together with CO_2 meters, will indicate whether correct combustion conditions are being obtained.

Progress in fuel utilization and electrification is far from satisfactory. The board rightly subscribed to a policy of electrification, because many of the old steam-driven prime movers at collieries were worn out and uneconomical to run, but in the efforts to obtain major results quickly, we have been misled to some extent by the appalling lack of genuine data and costs from colliery operations in the past. Accurate figures of coal consumed were almost unobtainable, and in many cases, never even weighed. Analysis of fuel was rarely carried out. Electricity purchased was a cost well recorded because it had to be paid for, but few collieries knew the cost of using it. Compressed-air costs are even estimated today and many pits can only boast of a flow meter measuring total output of the compressors. In the process of electrification the base load machines, such as fans and compressors, have been converted first, mixed-pressure turbo-generators have been shut down, and the steam winders have almost been the last items for replacement, with consequent havoc to any efficient working of a boiler plant.

Instrumentation has always been unpopular in the mining industry, and even today it is hard to convince certain people of the true value of the evidence these measuring devices produce. Until quite recently the boilerhouse operatives were totally unskilled, a position now happily remedied.

The time has now come when operational and cost control must be introduced into all collieries. Cost control of power use is now considered to be an essential requirement in all modern industrial plants, and only after it is introduced in all pits and methodical analysis applied to every section can costs be brought down speedily and effectively. The board has already introduced such a scheme and pilot areas have been selected in each division (Area 8 in the North-Eastern Division), and it is arranged to implement the scheme in three phases. Fig. 2 shows the proposed stages in the implementation of the scheme.

The first phase will see the introduction of the scheme under the control of an Area fuel and power engineer, together with necessary assistance and facilities for meter repairing and testing. Certainly a greater degree of metering will be required to give sectional control of power supply and use.

The second phase will incorporate a revision of the present wage and material declarations to introduce a standard form of analysis for new sectionalized cost details.

The third phase is intended to complete the scheme by establishing the costs of buying generated power and to indicate where the power is being used and a cost referred to it, by which means the true operating costs of, say, a coal-preparation plant can be established and comparisons fairly made. The analysis will be made by the Fuel Utilization Branch for the whole of the country from evidence received following the return of a standard form of cost control.

Without any doubt the standard scheme will be introduced into all Areas after the third phase of the pilot scheme is completed. Such a scheme should be welcomed if only to appreciate that any comparisons made were true ones and sound evidence of inefficiencies could be pinpointed and acted upon.

Finally, the power, heat, and light cost can be kept down; constant care and reminders are necessary and frequent tests must be made to prove maintenance of plant efficiency.

DISCUSSION

MR. C. N. RATCLIFFE said that at many pits it was necessary to use compressed air in small quantities at weekends. The smallest compressor at the pit could be one of 4,000 cu. ft./min., and in view of this he asked what the economics of installing a 1,000-cu. ft. set would be for weekend work, for a running period of, say, 20 hr.

Replying, the AUTHOR said the inference behind the question was very sound; it could be proved that careful selection of compressor sizes to meet the load demand could give good economies. At one large colliery in the North-Eastern Division a maximum load of 23,000 cu. ft./min. could be met by running five 5,000-cu. ft./min. electric compressors, but one of them was sufficient to provide the weekend load of about 4,000 cu. ft./min. Other combinations could provide efficient running for the afternoon and night shifts. The additional capital cost for a small compressor to suit the weekend load could generally be recovered very quickly.

In reply to MR. C. MACHIN, the AUTHOR said there appeared to be no quick way of reducing power, heat, and light costs, but he thought an analysis of each colliery's costs would reveal the existence of two large items well worth examining in detail. Firstly, "coal to boilers" and secondly "purchased power." Both of these costs were obviously influenced by the amount of power used to produce a ton of saleable coal.

He suggested that the first consideration should be towards getting a better load factor and more constant load. Next, losses and wastage on all power use should be eliminated, particularly on methods of space heating, large prime movers, and compressed air. Steam generation was always under suspicion, and when one had done all possible to improve these items, then the strict control of quantity and price per ton of boiler fuel would bring about a lowering of costs. With pur-

chased electricity they must get the best out of the tariff by immediately improving the power factor of the system, which was certainly not hard to do. Readjustment of loads for a higher load factor should then be made.

MR. E. BRAMMER asked for a reason for putting into operation a colliery power station such as Grimethorpe. He also asked if it was cheaper to produce power that way then by taking it from the Central Electricity Generating Board, and was it the policy for the future.

In gassy mines it was necessary to have methane drainage to work highly mechanized faces which gave a very high gas yield. In such cases methane drainage would help the power cost, but there were cases where it was not necessary. He asked if methane drainage should be adopted as a general policy.

The idea of Grimethorpe power station as originally conceived was sound and profitable, but, due to policy changes at national level and the need to make agreements with the Electricity Generating and Distribution Board, the profitability became problematical, said the AUTHOR in reply. As a generating station, it had fulfilled the planned requirements and the whole of the output from the Kents Seam, mined and conveyed direct to the station, was all being used, together with most of the Area's low-grade fuel. But when fuels of many types, from run-of-mine to slurries, had to be blended on site and converted to steam on boilers designed for a wider range of fuels then the ultimate cost of electricity generated was obviously much dearer than units produced in a new high-output station of the generating authority.

They had proved that the economics of producing electricity at the board's power stations was intimately connected with the need for internal distribution, and to operate within a system having a certain amount of colliery generation in order that the station could have a good load factor. They handed over or disposed of most of the local distribution systems, so the AUTHOR could not foresee any more power stations being built by the NCB, especially in the North-Eastern Division, where there was both large generation capacity and an adequate distribution system operated by the electricity authorities.

Methane Extraction Not Advocated

Extraction of methane, purely for power generation alone, was not advocated. It was only when utilized as an accessory to the need to improve face conditions with high gas yield that there was any economy. If the cost of extraction was added to the generating cost, it would not be comparable to other forms of power generation.

MR. J. L. DAVISON said attempts were sometimes made to save power and difficulties arose from extraneous sources such as with the workmen when attempts were made to save power used for heating colliery houses, bath houses, welfare buildings, etc. He was interested to know what the authors' views were with regard to this. He also wondered if boiler-house practice had changed as much as the author had indicated.

There could be no doubt, replied the AUTHOR, that any attempts made to reduce power consumptions on the items mentioned would not meet with any success. In his experience any agreement made to supply power to colliery villages, etc., never paid off, and there was an inevitable rise in consumption with the advent of more home equipment.

With regard to the training of boiler operatives, the introduction of mechanical stokers compelled them to find a better class of operative than those usually employed on hand firing of Lancashire boilers. That could only be met by a training scheme and they had sent men to the course arranged by City and Guilds for several years. Even the last course in 1959 indicated that 20 men in the North-Eastern Division obtained their boiler operators certificate, although the field had indeed become very thin. With almost 65 per cent. of boilers now fired by mechanical stokers and most of them looked after by operators who had had some form of training he was convinced there had been a great improvement in operational control.

CORRESPONDENCE

[We accept no responsibility for the statements made or the opinions expressed by our correspondents.]

MINERS' HOURS

To the Editor of IRON AND COAL.

SIR,—The important part of the miners' working day is the time spent in productive work. The average distance from a pit bottom to a working place in this country today is of the order of a mile. The average time taken in travelling from the pit bottom to the working place and back again at the conclusion of the shift is probably of the order of 40 min. Snap time absorbs 20 min., so that the actual productive time spent on the job is of the order of an hour less than the working shift.

By the time a miner has got to the pit, changed, collected checks and lamp, gone to work, returned and bathed, the day is pretty well absorbed, whether the working shift be 7, 7½, or 8 hr. To obtain the full benefit of shorter working hours the miner should have a whole day per week away from the pit.

Surely, therefore, the logical solution is to have the longest effective working shift and the fewest number of working days per week. I have always thought that the miner should have an official five-day working week, giving him every week the opportunity of a long weekend in the open, and that the working shift in the five days should be of an economical length, bearing in mind that in any event his day is fully absorbed. Such an arrangement would give five balanced working days, avoid the disruption of the unbalanced Saturday work, provide the maximum working time on the job, and enable the hours in the mining industry to be comparable with the hours worked in other industries.

It would be extremely interesting to hear the reaction of miners, management, and unions to this suggestion.
—Yours faithfully,

F. COLIN SWALLOW.

Stile Close,
Burford (Oxon).
August 20, 1960.

Rourkela Steel for Germany

A consignment of 2,000 tons of heavy steel slabs weighing 8 to 10 tons each has been sent to West Germany from the port of Vizagapatam. This forms part of an order for 12,000 tons of steel placed by a West German firm. The consignment included a substantial quantity of steel produced at Rourkela by the LD process. It is hoped that with the heavy plate mill at Rourkela going into operation by the end of this year, wide plates will be available for use by India's engineering industries, and more orders for steel can be also expected from West Germany.

The author has received an interesting letter[1] from Mr. V. D. Talwar, chief superintendent of the Bhilai Steelworks, regarding certain remarks which the author made in his article[2] on the iron and steel industry in India. The letter contained several points of criticism concerning the suggestions made for the future development of the industry in India, especially the role to be played by open-hearth furnaces. The main points of criticism from Mr. Talwar's letter were published in last week's IRON AND COAL.

FUTURE DEVELOPMENTS IN STEELMAKING

—with Special Reference to India

By G. REGINALD BASHFORTH, F.I.M.

MR. TALWAR was very critical of the author's remark that "the suggestion to increase the capacity of the Bhilai plant by additional open-hearth furnaces seems to be contrary to modern trends and not entirely in the interests of Indian economy." The author, however, has no hesitation in repeating that opinion.

The author feels that the various points raised by Mr. Talwar are of such importance and general interest as to merit full examination and reply. The author appreciates that he has much to learn about Indian raw materials and conditions, but the existence of an excellent low-phosphorus pig-iron immediately suggests the adoption of the LD or some similar steelmaking process whereby high rates of productivity can be achieved at a low capital cost. Owing to its low scrap requirements, a pneumatic process is of particular interest in the case of a plant which has to depend almost entirely on its own process scrap, which would appear to be the position at Bhilai.

The Bhilai Plant

The author has no intention of criticizing the Bhilai plant, which he has had the privilege of visiting on more than one occasion. It is a very good plant, which shows careful planning, thorough construction, and efficient commissioning. Like all steel plants, however, there are features which any experienced production metallurgist would criticize. One of the first criticisms would undoubtedly be the mode of firing the open-hearth furnaces. The use of preheated coke-oven gas cannot be regarded as a modern trend. Surely the employment of cold coke-oven gas, with tar or oil as a luminant, is more representative of modern practice.

Since Bhilai is at present a long distance from scrap-producing industries, it must depend on its own process scrap, which should not exceed 22 per cent. This position will necessitate the operation of approximately 80 per cent. of hot metal, which is not an ideal mixture for the attainment of high rates of productivity. In order to be really efficient a 250-ton open-hearth furnace should produce at a rate of at least 25 tons per furnace per hour, which, although not impossible, is extremely difficult with this high percentage of hot metal, even though the quality of the hot metal is good.

The author understands that it is the intention to assist productivity by the use of an oxygen lance, inserted through the roof of the furnace. There is ample evidence to show that considerable increase in productivity can be achieved by the adoption of this practice, but why install an open-hearth furnace for oxygen steelmaking when the same results can be achieved in the converter at a very much lower capital cost? Although the use of the oxygen lance in open-hearth furnaces when producing low-carbon steels may be justified, the employment of oxygen either for lancing or enrichment of the combustion air would appear to be an expensive method of improving the productivity of a piece of almost redundant apparatus.

Steel Quality

Whenever the merits and demerits of the open-hearth and pneumatic processes are discussed, considerable emphasis is always placed on the greater control of steel quality afforded by the open-hearth process. The author would suggest that for the majority of the commercial grades of steel made by the open-hearth process today, this greater process control is not really required. The tonnage of high-grade steel which necessitates this more accurate quality control is relatively small.

Large tonnages of high-grade rail steel have been made in the acid-Bessemer converter[3]. The author has experienced the successful application of LD steel for the manufacture of seamless steel tubes, bright-drawn bars, and forging billets. The only defects encountered in the application of this particular batch of LD steel could be attributed to faulty casting pit practice. Gaines[4] attributes the rapid advance of the LD process in North America partly to the good quality of the product obtainable. There are undoubtedly certain classes of steel where a high degree of process control is desirable,

such as the manufacture of dropforging billets and low-alloy steels. In this case the employment of the acid or basic open-hearth furnace, or the basic electric-arc furnace, would be recommended. Since in the basic open-hearth process most of the deoxidation is performed in the ladle, the only advantage of this process would appear to be the degree of control of oxidation possible in the bath and the accuracy with which the finishing temperature can be regulated.

Before discussing the merits and demerits of the various processes further, a brief review of the chief causes of steel failures would appear to be justified.

From the author's experience in dealing with customer's complaints, it would appear that steel defects arise generally from three causes:—

(1) Faulty casting pit practice, which it is suggested accounts for the greater percentage of failures. So often steel defects can be traced to running stoppers, the use of hot moulds, the employment of the wrong type of mould, and frequently sheer carelessness on part of the casting pit personnel. In order to achieve a high standard of casting pit practice, however, the accurate control of the tapping temperature is of paramount importance.

(2) Incorrect deoxidation, which gives rise to seamy bars. To some degree this feature will depend on the control of bath oxidation, but a full discussion of this subject is beyond the scope of this article. It is suggested, however, that the oxygen content of the bath at the time of tapping will be influenced largely by the carbon content of the bath, providing the slag and metal is in equilibrium.

(3) Dirty steel, which may result from the wrong choice of deoxidizers, the over-oxidation of the metallic bath with consequent excessive amount of deoxidation products, inadequate carbon boil in the case of the open-hearth process, faulty slag formation, or bad refractory materials.

In the acid open-hearth process or in the basic electric-arc process, deoxidation can be achieved by alloy additions to the bath, whereby a cleaner and more homogeneous steel should be obtained. The degree to which bath deoxidation can be done in the basic open-hearth furnace is limited, hence deoxidation is largely confined to the ladle, which may aggravate the non-metallic inclusion problems. In many of the latest LD converters a taphole is provided just below the nose of the converter, which enables most of the oxidizing and phosphoric slag to be removed, thereby permitting the addition of alloying elements to the converter. This feature should improve the cleanliness and homogeneity of the finished steel.

Herty[5] has demonstrated the beneficial effect of employing silico-manganese alloys for deoxidation purposes. When the Mn/Si ratio is high, that is, 4 to 1 or more, it is possible to form deoxidation products containing less than 50 per cent. silica and nearly as much manganese oxide. This silicate is quite fluid, which reduces the likelihood of it being entrapped as non-metallic inclusions. These silico-manganese alloys also possess the additional advantage of having a lower carbon content than ferro-manganese, whereby the steel can be tapped at a higher carbon content. This point is of special interest when making low-carbon steels. This carbon content influences the amount of oxygen in the metal.

It has been shown[6] that as the carbon content in the melt decreases, the dissolved oxygen increases slowly until the carbon is down to 0.4 per cent. C., when the oxygen content is about 0.01 per cent. As the carbon content falls from 0.40 per cent. to 0.20 per cent. the oxygen solubility is accelerated, while below 0.10 per cent. C., the oxygen content of the melt rises rapidly on further reduction of carbon even under a pressure of one atmosphere. This feature stresses the importance of tapping the metallic bath at the highest possible carbon content consistent with meeting the analysis specified.

A short time ago a small top-blown converter was installed at the Banaras Hindu University with the object of demonstrating to students not only the operation of the process, but also the way in which the relative rates of dephosphorization and decarburization can be controlled. By impinging the oxygen at a low pressure with the simultaneous addition of lime, it was possible to reduce the phosphorus in the pig-iron from 0.32 per cent. to 0.028 per cent., while the carbon only dropped from 3.85 per cent. to 3.20 per cent. Decarburization, however, can be accelerated easily by increasing the oxygen pressure. When making steel within the 0.30 to 0.50 per cent. C. range, it has been possible to "catch the carbon on the drop" by careful observation of the flame without the need of instrumental control.

In the LD process it is possible, by standardization of practice, to control the finishing temperature, by scrap or oxide additions to the converter during blowing, so as to attain a reasonably close limit. The objective should be to end the blow with a temperature slightly higher than that required and to hold the charge in the converter until the desired temperature is attained. An ordinary immersion pyrometer is employed for determining this temperature.

Indian Economy

The author does not profess to be fully conversant with Indian conditions, but it is obvious that most plants will have to depend for their scrap supply on the process scrap arising within their own works. This process scrap will amount to 20 per cent. to 22 per cent. of the ingot output, while a further 20 per cent. of scrap will arise, due to fabrication of this steel and natural wastage. This additional scrap will most likely arise in remote parts of the country and the cost of transporting it back to the steelworks would be prohibitive. In most cases it would be more convenient and economical to convert it into high-grade steel near to the source at which it arises. The number of successful privately and publicly

owned open-hearth and electric-furnace plants found in different localities in India appear to confirm this opinion.

As the various hydroelectric and thermal-electric schemes come to fruition, there is little doubt that the basic electric-arc furnace will supersede the open-hearth furnace for the cold-metal process, for the reasons quoted in the original article[1]. It would appear, therefore, that the future pattern of steelmaking in India will be based chiefly on large integrated plants, located near the ore fields, depending entirely on their own process scrap and a high percentage of hot metal; and a number of small electric-furnace plants at strategic points utilizing the scrap arising from fabrication and natural wastage.

At the recent symposium on pilot plants held at Jamshedpur it was suggested[7] that there appeared to be scope for a few small, less mechanized iron and steel plants in certain localities. In certain parts of Madhya Pradesh, Rajasthan, and South India, where there are deposits of suitable iron ore, but little or no coking coal, this type of plant would be of special interest. This wider dispersion of the industry would possess obvious national advantages. It was suggested that these plants, which should have an annual capacity of 200,000 to 250,000 ingot tons, should consist of 10-ft. dia. hearth, hand-charged blast furnaces and 15-ton basic-lined, side-blown converters.

Review of Steelmaking Processes

Recently, Colclough[8] has made a very thorough review of the various steelmaking processes, but the author finds some of his arguments most unconvincing. The first difficulty is the fact that he[8] introduces the capital cost of the coke ovens and blast furnaces into consideration of the economics of steelmaking. The initial consideration must be the basis of steelmaking and the type of product being made. The evaluation of the merits and demerits of any steelmaking process will depend on whether the steel is to be made from a high percentage of pig-iron or from a high percentage of steel scrap.

If steel production is to based on the use of a high percentage of steel scrap, the employment of large basic electric-arc furnaces appears to be indicated, for reasons mentioned in the author's previous article[1]. Unfortunately, Colclough[8] dismisses the subject of large electric-arc furnaces in this connection very briefly, in spite of the recent development at the United Steel Companies in the UK[9], where 21 basic open-hearth furnaces operating a cold-metal process are to be replaced by six 150-ton electric-arc furnaces with an annual capacity of 1,350,000 ingot tons. So far as the UK is concerned, perhaps the Round Oak Steel Works should be given the credit for pioneering this development of the cold-metal practice for bulk ingot production.

When steel production must be based on the use of a high percentage of pig-iron, the capital cost of the coke ovens and blast furnaces is common to any process of steelmaking, which must, therefore, be selected on the basis of economics and the ability to produce the type of steel required. Naturally, the LD or some similar oxygen steelmaking process, which offers high productivity at low capital cost, must be advocated. It may be necessary to provide some open-hearth or electric-arc furnaces to accommodate a demand for a percentage of higher grade steel.

Where it is necessary to provide for the production of a proportion of special or higher grade steel, the electric-arc furnace would appear to be the obvious choice, owing to the lower capital cost, higher thermal efficiency and the greater flexibility. The only amendment which the author would make to his original statement regarding the balance of the steelmaking processes in a plant which has to depend entirely on its own process scrap, would be the adoption of electric-arc furnaces in preference to open-hearth furnaces. He would suggest that 80 per cent. of the steel be produced by a pneumatic process and the balance by the basic electric-arc process, thus:—

Process.	Annual ingot output.	Annual scrap make.	Annual scrap usage.	Annual usage of ore/mill scale.
	Tons.	Tons.	Tons.	Tons.
Pneumatic	800,000	176,000	10,000	96,000
Electric arc	200,000	44,000	210,000	24,000
Total	1,000,000	220,000	220,000	120,000

About 25,000 tons of the total ore and oxide requirements will be provided by the mill scale and cinder produced (approximately 2½ per cent. on the ingot throughput), while the total oxide requirement may be still further reduced by a tonnage of purchased steel scrap. The plant is, however, self-sufficient without these purchases and the use of oxide in the converters improves the metallic yield, hence improving the economics of the same.

The selection of electric furnaces in preference to open-hearth furnaces not only reduces the capital cost and gives greater flexibility, but also provides a better thermal or energy balance. As will be seen from Table 1, in an integrated plant of this type, there is sufficient energy available for the melting of the steel in the electric furnaces and for the other power requirements of the plant, In fact, there is a surplus of coke-oven gas, which can be sold for domestic purposes.

Oxygen Steelmaking

Owing to reports which have appeared in the daily newspapers concerning certain difficulties which have been encountered at Rourkela, there may be some criticism from certain Indian quarters regarding the suitability of the LD process, but the successful application of this process in different parts of the world should dispel any doubt as to its ultimate success. Indian pig-iron is suited ideally

TABLE 1.—*An Approximate Energy Balance of an Integrated LD Electric-arc Steel Plant.*

The calculations are based on the consumption of 9,440 lb. of pig-iron in the production of 5 ingot tons of steel, of which 4 ingot tons are made by the L/D process and 1 ingot ton by the basic electric arc.

Coke-oven Gas (at 500 BThU/cu. ft.).

Approx. 12,750 cu. ft./ton of pig-iron, that is:— 12,750 × 9,440 / 2,240	53,732 cu. ft.	
less heat required for heating ingots and blooms:— 2,500,000 BThU/ton × 5 tons / 500 ..	25,000 cu. ft.	
Carried forward		28,732 cu. ft.

Blast-furnace Gas (at 90 BThU/cu. ft.).

Approx. 114,350 cu. ft./ton of pig-iron, that is:— 114,350 × 9,440 / 2,240	481,900 cu. ft.	
less 10 per cent. losses 48,190 cu. ft. 20 per cent required at the stoves 96,380 cu. ft.	144,570 cu. ft.	
	337,330 cu. ft.	
less 30,000 cu. ft./ton of pig-iron required at the coke ovens (lean gas practice), that is:— 30,000 × 9,440 / 2,240	126,430 cu. ft.	
Carried forward		210,900 cu. ft.

Heat Value of Available Gas.

28,732 cu. ft. × 500 BThU	14,366,000 BThU.
210,900 cu. ft. × 90 BThU	18,981,000 BThU.

Power Requirements of Plant.

Coke ovens ..	20 kWh/ingot ton	..	100 kWh.
Blast furnaces ..	18 kWh/ingot ton	..	75
Converter plant ..	100 kWh/ingot ton	..	400
Arc furnaces ..	Melting—600 kWh/ton Auxiliaries—25 kWh/ton	..	625
Blooming mill ..	20 kWh/ingot ton	..	100
Small mills ..	80 kWh/ingot ton	..	400
		Total	1,700 kWh.

Power Generation. Allowing 15,000 BThU per kWh, the generation of this quantity of power would require:—

1,700 × 15,000	or	25,500,000 BThU.
heat available in blast-furnace gas		18,981,000 BThU.
additional heat required from the coke-oven gas		6,519,000 BThU.

or $\frac{6,519,000}{500}$, that is, 13,038 cu. ft.

Surplus Coke-oven Gas. This position means that there is 15,694 cu. ft. of surplus coke-oven gas available on every 5 ingot tons made, or on an annual output of 1,000,000 tons of ingot a total of 3,138,800,000 cu. ft.

It should be noted that there is an additional figure for waste heat ex-converters amounting to:—

$\frac{210,000 \times 4}{5}$ or 168,000 BThU/ingot ton.

to the LD process and any difficulties must be regarded as of a temporary nature.

The author understands that one of the chief difficulties experienced at Rourkela concerns the durability of the refractory lining of the converters. This trouble has been experienced at other plants, but it has been surmounted. In India there are ample supplies of suitable magnesite for the lining of these converters, providing the magnesite is correctly processed and the proper technique of installing the lining is adopted.

The small top-blown and side-blown converters at Banaras Hindu University were rammed with Indian magnesite and, in spite of their intermittent operation, they have proved highly successful. Magnesite, mixed with sufficient water-glass to give the desired plasticity, is rammed into position around a former, every effort being made to ensure the thorough consolidation of the lining. This consolidation should be achieved much more easily in a large vessel, where pneumatic rammers can be employed. After drying, this lining must be slagged. A small quantity of metal, about 5 per cent. of the nominal capacity of the vessel, is

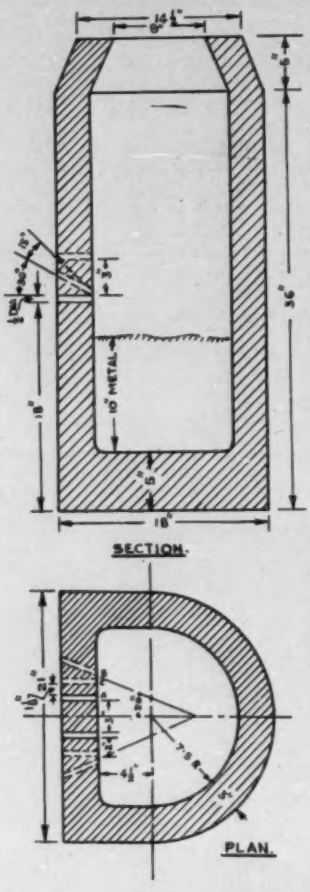

FIG. 1.—5-CWT. BASIC-LINED SIDE-BLOWN CONVERTER. THE BOTTOM OF THIS VESSEL HAS BEEN RAISED RECENTLY IN ORDER TO BRING THE METAL NEARER TO THE LOWER ROW OF TUYERES.

blown with sufficient lime to give a slag containing CaO 25 to 30 per cent., SiO_2 10 to 15 per cent., and FeO 30 per cent. When this slag has been splashed thoroughly over the lining, any surplus is tapped and the lining, after setting-back for a short time, is ready for use.

Although the LD process has become firmly

established in many countries, and the Kaldo and Oberhausen Rotor oxygen processes are finding greater application, the author does feel that further investigation into the future possibilities of the basic-lined, side-blown converter are worthy of serious consideration. Harrison, Newell, and Hartley[10] demonstrated the advantages of oxygen enrichment in side-blown converter practice. As a result of these investigations, they suggested that this process had future possibilities for bulk ingot production. Lack of development in this direction has probably been largely due to the fact that their experiments were conducted in an acid-lined vessel, while the shortage of suitable pig-iron for an acid process has been a deterrent.

Sims and Toy[11] have demonstrated, however, that steel can be made from phosphoric pig-iron in a basic-lined, side-blown converter. Furthermore, they translated successfully their pilot plant results to a commercial scale using 26 to 30 tons of hot metal. Similar results have been achieved on a 5-cwt. capacity, basic-lined, side-blown converter at the Banaras Hindu University employing ordinary grades of Indian pig-iron containing 1.2 per cent. Si. and 0.32 per cent. P. This converter, shown in Fig. 1, is provided with three sets of tuyeres. The bottom row of tuyeres, which are horizontal, can be operated with air and/or oxygen together with powdered lime. The second row, which can be inclined at an angle varying from 30 deg. to 45 deg., operate with oxygen, while the upper row, which are horizontal, operate with air only for the combustion of CO formed as a result of the bath reactions, thereby obtaining the maximum heat increment from the elimination of this element.

This tuyere arrangement, together with the rotation of the vessel, can be utilized to control the relative rates of carbon and phosphorus removal. When the vessel is inclined at a small angle, approximately 5 to 10 deg., so as to maintain the maximum slag covering, and oxygen is impinged through the lower tuyeres at a low pressure together with powdered lime, ideal conditions for dephosphorization exist. It is even possible to dephosphorize pig-iron without any appreciable decarburization.

Rapid removal of carbon can be achieved by injecting oxygen at a higher pressure through the inclined tuyeres with the vessel rotated to an angle of 45 deg. In this position the angle of oxygen impingement is 90 deg., as in the LD converter; and the slag covering is reduced to a minimum, thereby ensuring better gas-metal contact and reducing the partial pressure of CO at the slag-metal level, resulting in the acceleration of carbon removal. The use of an air blast together with powdered lime during the early stage of the process should accelerate dephosphorization, which is a highly exothermic reaction, while the use of oxygen during carbon removal should reduce the likelihood of nitrogen pick-up at this stage. These points are at present being investigated further.

From the results so far obtained, the basic-lined, side-blown converter process would appear to possess all the advantages of the LD, Kaldo, and Rotor oxygen processes and, owing to greater flexibility, to afford better opportunity of quality control. There is no apparent difficulty in producing a wide range of plain carbon steels, varying from low carbon rimming steels of the ingot iron variety to fully killed steels containing 0.35 to 0.45 per cent. C., in which the carbon can be caught on the drop. When employing oxygen only, the oxygen consumption is about 3,000 cu. ft./ingot ton, but this figure can possibly be reduced by the partial use of air under certain conditions. This is one of several points which are at present being investigated.

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Electron Beam Melting Furnaces

ELECTRON beam melting furnaces are now being constructed in the US. They are at present of limited capacity, but the practicability of reaching 1,500 kW is envisaged by a writer in the June 6, 1960, issue of Steel. A furnace of this size is expected to produce smooth-faced circular ingots up to 50 or 60 in. dia., crack free, homogeneous, and with a low level of impurities.

A furnace unit of this type, which, of course, includes the so-called electron gun beam is a simple vacuum vessel or chamber fitted with an air lock, and handling equipment to permit continuous entry, cooling and withdrawal of materials. Present furnace capacity seems to be limited to 250 kW.

Operation starts with metal powder, sponge, sintered bars, or ingots. Even pressed machine turnings or trimmings can be used in the first melt.

The refining technique is based on the comparative boiling and vaporization points of impurities *v.* those of the pure metal and desired alloy additions. The shape of the electron gun used must vary to suit the metal being melted. The furnace can superheat metals to produce experimental reactions said to be impossible with any other method.

In operation during several hours, vaporized metal tends to collect in the gun, but the air lock and other facilities permit quick replacement.

Warren Spring's Research Programme

NEWEST of the research establishments of the Department of Scientific and Industrial Research, the Warren Spring laboratory, has, since it was officially opened in June last year, embarked on a versatile programme of research, covering several fields of immediate importance to industry. Among several investigations being carried out at present are two of considerable industrial importance. The mineral processing division's work with naphthenic acids represents not only a scientific advance but also a process with considerable economic advantage to industry, while the chemical engineering division's pilot-scale distillation plant offers modern research facilities in dealing with an older problem which is becoming increasingly urgent in modern industry.

The successful development in recent years of new extraction processes for the recovery of uranium has raised the possibility of applying these techniques to the recovery of more common metals. This will only be possible if cheaper reagents can be found to replace those used for uranium. The mineral processing division has been examining the possibility of using naphthenic acids for the extraction of metals such as copper, nickel, cobalt, zinc, and manganese. Commercial naphthenic acids, which are derived from crude petroleum oils and have extensive industrial uses, have not previously been considered for the recovery of metals from aqueous solutions. Their cost is only about £130 a ton, compared with the price range of £640 to £1,100 a ton for the alkyl phosphoric acids used in the recovery of uranium.

Extraction by Leaching

With many complex and low-grade ores the wanted metals can only be extracted by leaching (extracting a soluble metallic compound from an ore by dissolving it) with water or dilute acids. It is in the treatment of these leach liquors that naphthenic acids may have a possible use. The metals which are extracted by the reagent depend on the *p*H of the aqueous solution of leach liquors. It has been found, for example, that copper is extracted at *p*H 6, whereas nickel is extracted at *p*H 8. Thus, by carrying out the extraction in two stages, first at *p*H 6 and then at *p*H 8, a separation of copper from nickel can be obtained. Practical tests are now being carried out.

A further factor in the use of this technique is that it can be used to obtain concentrated solutions of metals from very dilute solutions. This is achieved by adjustment in the ratio of organic to aqueous phases and, in fact, a concentration of up to 10 can be obtained.

Recognizing the industrial importance of further research into distillation processes, the Warren Spring laboratory included this work in the programme of its chemical engineering division. Distillation techniques have been used on a rapidly increasing scale in the manufacturing chemical industry since the beginning of the century, but they are of such universal importance that even a small percentage improvement in the rate of distillation could bring a major economy. For example, at a recent symposium Sir Alexander Fleck referred to ICI's "distillation load" in 1959 as being 2,600,000 tons.

The distillation column at Warren Spring, which has 12 plates, is for pilot-scale work only. It is highly instrumented and is now being used for research in conjunction with an automatic computer. Full-scale plant may vary in size considerably, having up to hundreds of plates according to the purpose for which it is being used.

Three factors govern the mass-transfer efficiency of a distillation plate. These concern the area of contact between gas and liquid in the foam produced on the plate, the value of the mass-transfer co-efficients in the foam, and the time taken by the fluids passing through it. In turn, these factors may depend on the fluid's physical properties and the geometry of the plate. The laboratory has been studying these three factors in several ways. Methods have been developed for measuring the area of contact between gas and liquid on the distillation plate; apparatus to measure the time taken by liquids passing across the plate is also being developed and the values of the mass-transfer co-efficients are being measured by observing the rate at which dissolved gases are removed from a solvent by air passing through a distillation plate into the solution. Other methods being studied include measuring the bubbles passing through the plates in the distillation process by photographing and counting them.

Considerable progress has been made and the results should make it possible to predict the performance of distillation columns with more precision and so help plant designers to achieve greater economy.

Current research in the atmospheric pollution division is concerned with both assessment and abatement of atmospheric pollution, and is designed to assist the Ministry of Housing and Local Government in the administration of clean air legislation. The major problems are pollution by domestic smoke and sulphur dioxide from industrial users. Smoke from industrial coal has ceased to be a serious problem, though in some instances it creates a local nuisance. The laboratory continues its collaboration with local authorities in measuring pollution. It is studying the problems arising from fumes from diesel exhausts as well as methods of measuring low concentrations of oxides of nitrogen, which are known to be omitted by practically all fuel-burning appliances and which may be significant factors in air pollution.

The laboratory is also undertaking sponsored investigations for industry and other organizations, for which the most up-to-date pilot-scale plant is available.

Bloom Length Measurement

New Device Gives Substantial Savings

In the following note Mr. G. Hamilton-Jones and Mr. S. Johnson, of the research department of the Guest Keen Iron & Steel Company, Limited, outline an apparatus which has been developed and installed at the company's Cardiff works for the purpose of measuring the lengths of red hot steel blooms prior to rolling in a continuous mill. The authors will be pleased to give further information to readers interested in this or other applications of this device.

THE apparatus consists basically of two detector assemblies, mounted approximately 4 ft. from and parallel to the approach roller bed, an amplifier, and an indicator box. The indicators used in the apparatus are "Digitrons" and these can clearly be read at a distance of 40 ft.

The bloom length is indicated immediately in the Flying Shear control box. Then, by reference to tables, the shear operator is able to adjust the length of cut billets from the ensuing bar in order that the short back ends may be kept to a minimum. Instrument and installation costs would be approximately £2,000.

Since the introduction of this apparatus in March, 1959, it has been claimed by the mill staff that the savings brought about are very considerable. For example, for a mill with an output of 5,000 tons per week, the annual saving would well exceed £100,000.

Capabilities and Advantages

The following notes give some idea of its capabilities and advantages:—

(1) The bloom length can be measured while it is travelling at any speed. Stopping or positioning is quite unnecessary.

(2) Although in the present installation it is only required that the accuracy should be within ± 2 in. of the total length (35-80 ft. in this mill), this can be improved to suit any particular requirements.

(3) No errors arise due to the human element.

(4) As mentioned above, the length of the bloom is immediately indicated to the operator of the Flying Shear and at any other station if required.

(5) The complete sequence of operations, reset and measure, is carried out automatically by the blooms themselves when on the mill approach rolls.

(6) The bloom lengths are measured electronically and no physical contact with the bloom is required.

(7) The apparatus may be connected directly to a chart recorder and/or computer as required.

Three incidental advantages arise from (1):—

(*a*) Since the blooms are measured while travelling at normal conveyor roll speed, there is no delay for measuring purposes, and hence the bloom loses no valuable heat.

(*b*) Because stopping and positioning are not required there is a considerable saving of wear and tear on conveyor roll gear.

(*c*) Since there are no delays due to bloom measuring, the mill can deal with greater throughput.

Finally, it must be emphasized that this is an outline of a particular application of the apparatus; it could, of course, be adapted to suit any situation where a linear dimension of moving red hot material is required.

Second International Mining Congress

THE International Organizing Committee in Warsaw and the Czechoslovak Academy of Sciences in Prague have arranged for the Second International Mining Congress to take place in Prague from May 14 to 20, 1961. The theme of the congress will be "The Improvement of Mining Economy." A total of 43 papers will be presented, the subjects being sub-divided into the following aspects:—

(*a*) New mining techniques.

(*b*) The optimum size of mines and relationship of size to mining efficiency.

(*c*) Improvement in productivity and economic results by (1) mechanization and automation of production; (2) exploitation of mineral reserves at the optimum rate (3) improvement in the utilization of product by more complex mechanical, chemical treatment and of selective mining; (4) organization of production.

(*d*) Evaluation of mine undertaking by technical and economic indices.

(*e*) The application of "operational research" techniques to the solution of mining and related problems.

The congress will be held at the International Hotel, Prague, under the auspices of the Czechoslovak Executive Committee. The membership fee will be nominal and members will be required to make their own arrangements for accommodation through the Czech Tourist Agency—Cedok. Between May 21 and 27 a series of excursions, open to participants, will be arranged.

Further information may be obtained from the Secretary, Czechoslovak Executive Committee, International Mining Congress, Prague 2, Lazarska 7, or Prof. J. T. Whetton, Mining Department, The University, Leeds 2.

New Equipment and Products

Power Transmission Unit

AN entirely new venture into the field of variable speed transmission is illustrated in Fig. 1. It is being manufactured by Fairbairn Ulro, Limited, Leeds, a subsidiary of Fairbairn Lawson Combe Barbour, Limited. The unit, known as the "CONtorq," is of comparatively simple construction, built on robust lines to precision standards.

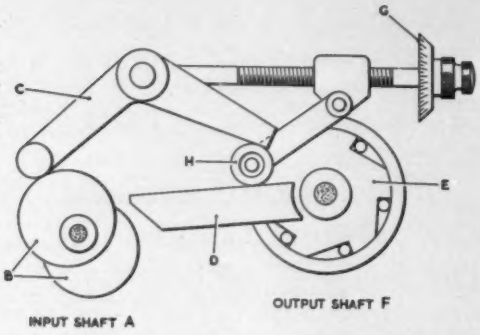


FIG. 1.—ARRANGEMENT OF THE "CONTORQ" VARIABLE SPEED UNIT.

The design is revolutionary in that it is completely positive, based on sound mechanical principles and, by the complete absence of fluid or friction properties, will, it is claimed, maintain accurately the selected speed, regardless of changes in temperature, humidity, or atmospheric conditions which may affect other variable-speed units. The standard unit operates from a constant input speed of 450 r.p.m., which gives an infinitely variable speed range on the output shaft of 0-50 r.p.m. Speed changes are made by the turn of a graduated dial, and speed changes may be effected while the unit is in operation or at rest. Remote control by servo or push-buttons can be provided if required.

As its name implies, the unit will transmit constant torque throughout its entire speed range. Two single lobe cams B are secured to the input shaft, the cam lobes being fixed at 180 deg. to each other. Rotation of the cams imparts an oscillating movement to two levers C which, in turn, oscillate two levers D, each of which is in contact with a roller-type free-wheel mechanism E attached to the output shaft F. Adjustment of the control knob C moves roller H, which is interposed between the levers C and D, thereby varying the angular movement of the two levers D from zero to a maximum. The angular arrangement of the cam lobes imparts a continuous motion to the output shaft, *i.e.*, as one free-wheel is driving the other is returning to its starting position. The cams are designed to give constant angular velocity and overlap to eliminate loss of movement at the change from one free-wheel to the other.

The "CONtorq" unit, as will be gathered from Fig. 2, has been designed on modern lines, finished in polychromatic paint and has machined faces both on the input and output sides. These machined faces are intended for the mounting of auxiliary equipment, *i.e.*, flange-mounted motors, output attachments such as worm and wheel units, bevel attachments for change of direction, and so on. Provided with a machined base and holes for fixing bolts, the unit can be supplied with either right- or left-handed input and output shafts. Completely sealed and self-lubricating, with oil level indicator, the unit will run continuously with no attention other than an occasional topping-up with oil. Present applications include small conveyor systems, mechanical handling, machine tools, and other uses involving variable speeds.

FIG. 2.—"CONTORQ" VARIABLE SPEED UNIT.

Portable Blast Cleaner

KNOWN as the Educt-o-Matic, a completely self-contained abrasive/blast-cleaning unit, no bigger than a small hand vacuum cleaner, is now being produced by Hodge Clemco, Limited, Sheffield. The machine (Fig. 3) weighs only 7 lb. and contains its own vacuum pick-up and dust-extraction unit ready for attaching to a compressed-air line. The connection should be ¼ in. internal diameter, to pass 33 to 60 cu. ft./min. at 90 to 100 lb./sq. in. There are no electrical connections.

The Educt-o-Matic is invaluable in areas where open blasting cannot be done. It is small enough to fit through tank manholes and is ideal on small jobs that can be cleaned without dismantling, the blast head swivelling for use at any angle. The

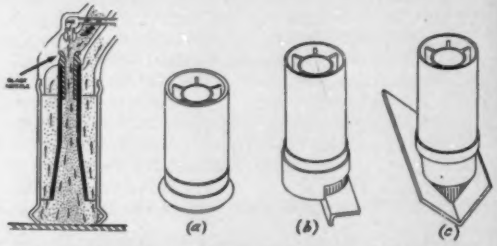


FIG. 3.—CUT-AWAY DRAWING OF EDUCT-O-MATIC AND (*a*) SHOWING STANDARD ATTACHMENT, (*b*) EDGE-CLEANING ATTACHMENT, (*c*) ANGLE-CLEANING ATTACHMENT.

abrasive is continuously recirculated and there is very little wastage. A full charge of 4 lb. will normally blast for 15 to 40 min., according to the skill of the operator, although very little skill is required for maximum efficiency.

Compressed air sucks the abrasive from its container into a Venturi-type nozzle, which blasts the air/abrasive mixture perfectly evenly over the area enclosed by a rubber boot, giving a blast pattern of 1 in. to 1½ in. dia. A vacuum picks up the abrasive with the material blasted from the surface and passes them to a small cyclone where they are separated, the removed material being blown into a dust bag for later disposal. Most common re-usable abrasives can be employed, such as steel shot and grit, aluminium oxide, silicon carbides, and walnut shells. A mesh of 40 or finer is recommended.

Floating Suction Strainer

FOR use with 6-in. hoses, a new floating suction strainer has been added to the "Dolphin" range designed and manufactured by Megator Pumps & Compressors, Limited, 43, Berkeley Square, London, W.1. The new strainer, the largest in the range, is capable of dealing with water flow at rates of up to 750 gal./min.

The main use for the strainer up to present has been in dewatering mines and quarries and in sump emptying. The 6-in. strainer is intended for a wide variety of industrial uses, such as cooling-water intakes from rivers and open reservoirs, and for irrigation and other purposes where high water-inputs are required.

In operation, water is drawn from just below the surface, so avoiding sand or silt from the bottom and floating matter on the surface. Vortex formation is prevented, first by reason of the cylindrical disposition of the entry holes and secondly because any tendency to create a vortex is automatically countered by a slight sinking of the strainer. The float chamber is filled with a moulding of expanded polystyrene foam, which provides millions of separate water-tight air cells so that buoyancy cannot be lost as a result of accidental damage. The design ensures flotation in the correct posture, regardless of the twisting of the hose. The strainers are made entirely of plastics and austenitic stainless steel, so that they are virtually immune from corrosion.

Continuous Screen-type Centrifuge

RECENTLY introduced by International Combustion, Limited, London, W.C.1, is a continuous screen-type centrifuge of a compact and established design for the separation of solids from magmas and slurries (Fig. 4).

The machine, known as the "Dynoscreen," has many applications. It can function either as a centrifuge or centrifugal screen, handling a wide variety of materials, including coal and chemicals. It is not essential for the specific gravity of the solids to be greater than that of the liquor in which they are suspended.

Low power requirements, simplicity of operation, ease of installation and maintenance, and its thorough reliability are all features that recommend the centrifuge for use wherever high-duty performance is essential at minimum cost.

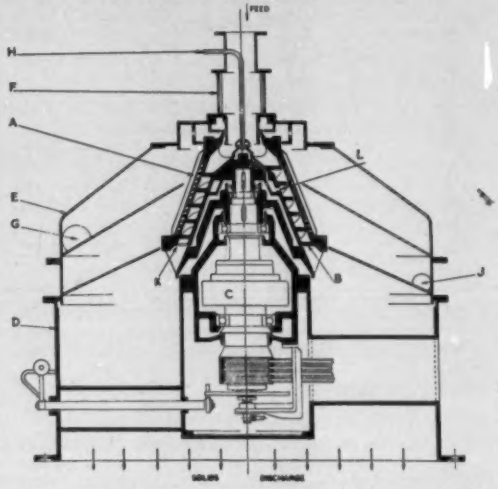


FIG. 4.—SECTIONAL VIEW OF THE "DYNOSCREEN."

A.—Revolving perforated cone. B.—Helical screw conveyor. C.—Gear unit. D.—Mild-steel base. E.—Stainless-steel or mild-steel hood. F.—Sight glass. G.—Effluent outlet. H.—Wash water inlet. J.—Wash liquor outlet. K.—Screen mesh. L.—Wash water outlet.

MINISTRY OF POWER STATISTICS

COMPREHENSIVE statistics of the fuel and power industries in the UK are contained in the 1959 edition of the "Ministry of Power Statistical Digest" (Stationery Office, 30s.). An important section deals with the energy position as a whole, showing, *inter alia*, the production and availability of primary and secondary fuels and consumption by class of consumer and type of fuel over a number of years. Separate sections deal with coal, electricity, gas, and petroleum in varying detail.

The new edition in the main follows the pattern of recent issues, but some new tables have been added and others omitted. Among the tables which have been reinstated after a lapse of some years are Nos. 10 and 19 in the coal production section. Table 10 gives a distribution of coal mines according to output per manshift and the number of wage-earners on colliery books. Comparison with Table 10 of the 1956 edition shows the change in the pattern of productivity of the mines that has taken place in the three years 1955 to 1958. Table 19 (comparable to 28 in 1956) shows the changes that have taken place since 1953 in working, getting, and transporting coal in the collieries.

The digest contains a summary table (No. 35) relating to accidents and pneumoconiosis in the coal-mining industry.

HUNGARY HAS RECEIVED a £50,000 order from India for mining machinery, according to the Hungarian News and Information Service. Indian mines, having tried out the Hungarian machinery, have ordered shaft-sinking apparatus, Kóta- and Hidasi-type loaders, and Ajtai-type cutters.

British Iron and Steel Industry Translation Service

FOLLOWING is a list of some new translations available from the Iron and Steel Institute under its translation service scheme. Translations are all classified by numbers, and these should be quoted on application, which should be addressed to the institute at 4, Grosvenor Gardens, London, S.W.1.

1631: "Study on the Hot-ductility of Steels. I—Study on the Hot Torsion Test." T. MORISHIMA. Tetsu to Hagané, 1958, May, pp. 552-559. £8.

1645: "Ten Years of the Coke Quality Agreement: its Significance for Coke-oven and Blast-furnace Operation." P. DICKENS and W. RADMACHER. Stahl u. Eisen, 1960, Feb. 4, pp. 129-136. £5.

1646: "The Presentation of the Results of Work Sequence and Transport Studies, and Punched Card Evaluation of Them." E. GRÖGER. Stahl u. Eisen, 1960, Feb. 4, pp. 165-169. £4.

1671: "The Development of Modified 12 per Cent. Cr Steels for Forgings and Castings in Steam Turbines." J. KOUTSKY. Hutnické Listy (Prague), 1959 (12), pp. 1105-1107. £5.

1672: "Intermetallic Phases in Two Types of Modified 12 per Cent. Chromium Steels." J. PLUHAR, *et al.* Hutnické Listy (Prague), 1959 (12), pp. 1108-1111. £6.

1684: "Measuring the Roughness of Cold-worked Surfaces." W. LUEG and U. KRAUSE. Stahl u. Eisen, 1960, Mar. 17, pp. 325-337. £8 5s.

1730: "Modern Ways of Organization and Technical Means of Increasing the Efficiency of Transshipment and Transport Installations for Steel Production." E. SCHIMKE. Stahl u. Eisen, 1960, Jan. 7, pp. 12-19. £6.

1739: "A Contribution to the Plastic Forming of Internal Threads." R. KRETSCHMER. Werkstattstechnik, 1960, Jan., pp. 12-14. £2 15s.

1743: "Operational Investigations on the Influence of the Drawing Temperature on the Mechanical Properties of Drawn Steel." F. SCHWIER. Stahl u. Eisen, 1959, Oct. 1, pp. 1385-1391. £4 15s.

1745: "Development of Scrap-iron Quantities and Prices in the European Coal and Steel Community." W. A. GÜLDNER. Stahl u. Eisen, 1960, Jan. 21, pp. 90-101. £6 5s.

1746: "Mains Network Disturbances by Arc Furnaces." F. WALTER. Elektrotechnik, 1948, August, pp. 217-220. £4.

1773: "The Effect of Prestressing in Roll Housings on Roll Accuracy." O. PAWELSKI. Stahl u. Eisen, 1959, Sept. 3, pp. 1295-1297. £1 15s.

1776: "Increased Economy by the Use of Precision Castings." E. G. NICKEL. Industrie-Anzeiger, 1960, 82, May 10. £4 10s.

1779: "Investigations on the Activity of Carbon in Crystallized Binary and Ternary Iron-carbon Alloys." H. SCHENCK and H. KAISER. Arch. Eisenhüt., 1960, Apr., pp. 227-235. £6 5s.

1790: "A Contribution to the Investigation of Pressure Losses in Pneumatic Handling Systems" (with special reference to the influence of friction and weight of the material dealt with). H. W. HAHNEMANN. V.D.I.Z., 1960, Feb. 1, pp. 131-132. £2.

1802: "Direct Observation of Metal Surfaces by Reflection." C. FERT. Electron Microscopy: Proc. of Stockholm Conference, Sept., 1956, pp. 8-12. £2.

ELECTRONIC DATA PROCESSING IN GERMAN STEEL INDUSTRY

INTERESTING details of the use of electronic data processing machines in the German iron and steel industry are given in an account of a seminar held at the I.B.M. World Trade European Education Centre, Blaricum, Holland, last November, reported by R. J. Taylor, operational research department, British Iron and Steel Research Association.

The report* states that the development of electronic digital computers in Germany presents an uninterrupted story with very few setbacks. Computers developed naturally from the already then well-established conventional punched-card installations and the initial interest in punched-card installations stemmed from the work of the Betriebswirtschaft (Scientific Management Group). Nevertheless, German manufacturers in general were slow to enter the computer field. Even now little serious resistance is made to the sales of computers designed in other countries.

However, the German iron and steel industry itself is very conscious of the value of computers. Seven firms already have computer installations whose primary functions are commercial applications and, furthermore, at least 12 definite orders have been placed for deliveries within 1960 and 1961. These installations and orders do not include conventional punch-card installations with or without electronic calculators.

The seminal papers all concerned actual or potential applications of electronic data processing machines, but they were varied in topic. Certain features were common to all papers. Firstly, considerable effort was employed in the initial studies of any system before the computer was installed. These studies often took several years and they were generally conducted by the Betriebswirtschaft. Notwithstanding the above the actual economic justification of the computer installation generally was accepted as an act of faith, the initial study being to determine the use of the computer.

* Copies of the report, Ref. OR/CA/21/60, are available on application to BISRA, 11, Park Lane, London, W.1.

New Extrusion Presses for Sections and Tubes

IMPORTANT new features have been introduced by Schloemann Aktiengesellschaft, Düsseldorf, in its extrusion presses for sections and tubes. Particularly interesting is the design of the internally arranged mandrel manipulator and piercer and the rapid and simple manipulation of the tools by the rotary die head and die slide.

These advancements have improved the operational economy of the machines and the quality of the extrusions.

PRODUCTION OF bituminous coal and lignite in the US during July, according to the Bureau of Mines, US Department of the Interior, was 25,100,000 net tons, compared with 33,760,000 net tons in the previous month and 24,230,000 net tons in July, 1959.

Utilization of Dust from the OXYGEN TOP-BLOWING PROCESS

The wet cleaning plant for dust from the top-blown converter at Ijmuiden, Netherlands, and the preparation from the resulting sludge of a material suitable for addition to a sinter mix are described in this article by Marinus Krijgsman. The economics of the process are also discussed. The article is a translation from Stahl und Eisen (April 28, 1960, pp. 621-622).

IN the oxygen top-blowing process, pure oxygen is blown from above on to the metal bath through a lance. During the refining process, the impurities in the iron, such as phosphorus, silicon, sulphur, and carbon are oxidized and removed from the steel. However, some oxidation of the iron also takes place. The small iron-oxide particles thus produced escape in a finely dispersed state with the waste gas through the stack.

To prevent atmospheric pollution, the hot flue gases are cleaned in a spray cooler and subsequently in a Venturi scrubber down to at most 1 per cent. of the original dust content.

Sintering Raw Material from Sludge

In the pneumatic steelmaking plant of the iron and steel works at Ijmuiden, the dust trapped in the water is recovered and processed into a valuable sintering material. For this purpose, the water coming from the spray cooler and scrubber containing the dust, which is alkaline on account of the lime dust discharged from the converter, is passed to a thickener. The wash water flows in a closed circuit and the thickened sludge is further dewatered in a vacuum filter to a filter cake with about 27 per cent. moisture content. Hitherto, thickening and filtering have not given rise to any technical difficulties, provided a few precautions, which will be mentioned subsequently, are observed. The solid residue cannot be processed forthwith in the sintering plant with the other ore fines because this would unfavourably affect the porosity of the sinter mixture.

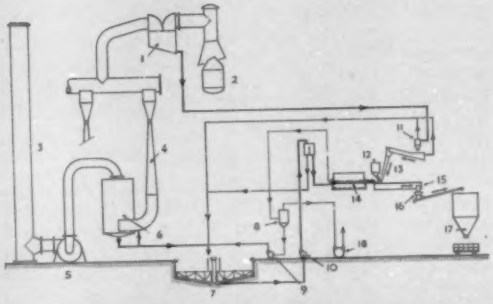


FIG. 1.—SLUDGE RECOVERY INSTALLATION FOR DUST FROM THE CONVERTER STEELWORKS.

1.—Spray cooler. 2.—Converter. 3.—Stack. 4.—Venturi scrubber. 5.—Gas blower. 6.—Separator. 7.—Thickener. 8.—Filtrate container. 9.—Filtrate pump. 10.—Sludge pump. 11.—Wet cyclone separator. 12.—Lime hopper. 13.—Classifier. 14.—Vacuum filter. 15.—Helical pugging mill. 16.—Crusher. 17.—Lime sludge tank. 18.—Vacuum pump.

For charging as a sintering raw material, the moist solid residue is dried continuously with burnt lime (grain size 0 to 3 mm.) which takes up the water in the residue to form hydrate of lime (Fig. 1). The resulting heat of reaction partially evaporates the water. Rapid and satisfactory preparation of the filtrate into pellets is obtained in a helical pugging mill.

The lime is added through a vibrating launder and is so adjusted that in the mixture the water is present practically only in the combined state. The mixture is granular and on account of the presence of hydrate of lime, has proved to be an outstanding raw material for sintering which mixes excellently with the ordinary, fine material. The chemical composition of the solid filtrate and the mixture is given in Table 1.

TABLE 1.—*Average Chemical Composition of the Filter Cake and the Mixture.*

	Fe, per cent.	Mn, per cent.	SiO_2, per cent.	CaO, per cent.	CO_2, per cent.	P, per cent.
Filter cake	54.6	1.4	0.5	10.0	4.8	0.15
Mixture ..	43.5	1.1	1.5	23.1	—	—

After mixing the raw material discharged from the helical pugging mill with ore fines in a ratio of 10:90 by weight, it is found that the speed of sintering can be increased by about 10 per cent. by which means also the strength of this sinter cake is somewhat improved.

The dust which has been dried with burnt lime should be stored in a dry place if it cannot be used at once for making the sinter mixture. An excessively moist mixture in the stock bunkers of the sintering plant would make accurate feeding difficult due to clogging.

A difficulty encountered in the recovery of the

dust produced by the oxygen top-blowing blast process arose from the fact that the particles first washed out from the gas in the spray cooler are to some extent of coarser grain than those from the Venturi scrubber. It has been found that these particles, in so far as their grain size exceeds about 150 microns, on account of their greater precipitation velocity block the pipes from the thickener to the suction pump, or the pump itself, and also the trough of the vacuum filter.

This difficulty has been provisionally resolved by interposing a settling tank in the thickener circuit. This settling tank is dumped periodically on a sand bed and the sludge, after being dried in a concrete mixer, is batch-treated with slaked lime. For some time past, the coarse particles have been separated in a wet cyclone and passed in a continuous circuit through a rake classifier, connected in series, in which they can be watered to about 20 per cent. moisture content. On account of the relatively low moisture content, this coarse dust can be processed simultaneously with the filter residue in the helical pugging mill to a single end product of the required properties. For this purpose, the wet cyclone separator and the rake classifier are erected above the pugger and treat the the dirty water discharged from the spray cooler. The water discharged from the wet cyclone separator and the rake classifier is fed to the thickener.

Technical Features

Measurements have shown that, in the pneumatic steelmaking plant at Ijmuiden, about 1.7 per cent. of the pig-iron charge issues from the converter as dust, with an iron content of 54 per cent. In addition to iron, lime dust is also carried away (about 3 per cent. of the added lime). Owing to this, the water in the thickener is alkaline and the iron oxide particles agglomerate and settle.

In the spray cooler and Venturi washer, 99 per cent. of the dust is separated from the flue gases. The dust content of the gases escaping into the atmosphere is in most cases not more than about 110 mg./cu. m. ((0.048 gr./cu. ft.) at s.t.p. The circulated water cleared in the thickener contains, when blowing is not in progress, about 20 mg. sediment per litre and up to 300 mg. per litre during the actual blow. The mean value over 24 hr. is about 50 mg./litre.

It is advisable to neutralize the circulating water discharged from the thickener with a small quantity of acid. The incorporation of a feeder pump controlled by the acidity of the water is planned, in order to keep acid consumption low. Pilot tests have shown that between certain limits of acidity, there is no risk of either corrosion or blocking of the pipes or the nozzles of the Venturi scrubber.

The screen analysis of the precipitated dust is given in Table 2. About 47 per cent. of the dust is separated in the spray cooler and a further 52 per cent. in the Venturi scrubber.

TABLE 2.—*Screen Analysis of the Dust Deposited.*

Grain sizes in microns.	Percentage volume precipitation in	
	Spray cooler.	Venturi scrubber.
	Volume as a	percentage.
< 1,000	99.3	—
< 750	98.2	—
< 500	97.2	—
< 250	90.9	—
< 175	84.6	99.95
< 125	81.7	99.91
< 75	80.0	—

The Drum Filter

In the rotating drum filter, about 3,000 kg. (6,600 lb.) dust (dry)/hr. can be processed in a vacuum of 600 mm. mercury. The filter cake contains about 27 per cent. moisture. The sludge water should be pumped from the thickener preferably undiluted, since otherwise a reduced filter output is obtained. Usually the sludge water before the filter has a specific gravity of 1.40 corresponding to a solid content of 37 per cent. The filter cloth can last for months in good condition. For drying, about 210 kg. (462 lb.) burnt lime with 85 per cent. CaO are required per ton of dust, calculated on the dry substance.

The end product should have a fine grained pellet structure. It is then a good raw material for the sinter mixture.

Economy

The economy of the dust utilization depends among other things, on the size of the plant required and on the current price of ore fines. Generally speaking, it can be said that the plant costs for sludge recovery, based on conditions in western Europe, can be recovered in a few years. At the Ijmuiden iron and steel works, a central installation for sludge treatment has been built in which, in addition to the dust from the steelworks, dust from the desiliconizing plant and fine sludge from the rolling mills is also treated. For this reason, special wet cyclone separators were installed. It is anticipated that in this way, in one year, about 18,000 tons dust dried with burnt lime, or more than 7,800 tons iron will be economically recovered.

Pilot tests have shown that it is also possible to treat blast-furnace dust sludge in a similar way to make a good raw material for sintering. It depends on local conditions, however, whether an installation for the recovery of blast furnace dust sludge will be profitable.

Summary

The dust contained in the flue gas of the pneumatic steelmaking plant at Ijmuiden is separated by a wet cleaning process with a spray cooler, a Venturi scrubber, a thickener, a wet cyclone separator, and a vacuum filter. By adding burnt lime to the filter cake and passing this mixture through a helical pugging mill, a valuable raw material for sintering is obtained which can be added to a mixture of ore fines in the proportion of 10:90. The dust content of the gas escaping into the atmosphere is about 100 mg./cu. m. (0.0435 gr./

(*Continued on facing page*)

Durgapur Progress Report

WITH the first and second stages completed, semi-finished rolled steel products are now being produced at the Durgapur Steelworks. When the remaining two stages are completed during the first half of next year, finished rolled steel products (*e.g.*, joists, channels) will then come into production. By the end of last June approximately 95 per cent. of the plant and equipment being supplied from the UK had been shipped; it amounted to approximately 243,000 tons. Since the first shipment in February, 1957, a regular flow of plant and equipment, structural steelwork, refractory bricks, etc., has taken place between UK ports and Calcutta Docks, with a maximum of approximately 16,000 tons a month during the peak months.

Civil engineering work and the erection of structural steelwork is nearing completion and activity at the site is now largely devoted to the erection of mechanical and electric plant and equipment.

Training of Personnel

For the Durgapur Steelworks the UK Government is financing, under the technical co-operation scheme of the Colombo Plan, the training in the UK of 350 engineers for the supervisory staff of the works. Up to June 30, 247 of these engineers had come to the UK of whom 168 have since returned to India, and there are at present 79 under training here in this country. The last group of engineers is expected about February, 1961.

Since the No. 1 coke-oven battery went into operation on November 23, 1959, approximately 178,000 tons of coke have been produced up to June 30. The No. 2 battery has been completed and is ready to be commissioned, while work has been commenced on the No. 3 battery, which is scheduled for completion by April, 1961. The coal washery is also now in operation. In the by-product plant area the sulphate of ammonia plant and the tar plant are in operation and the benzol rectification plant is nearing completion.

No. 1 blast furnace went into operation on December 29, 1959, and up to June 30 approximately 153,000 tons of pig-iron had been produced; the No. 2 furnace is nearly completed. The shell of No. 3 furnace has been completed and work is now proceeding on the erection of the skip hoist structure; this furnace is scheduled for completion by April, 1961, as part of the third stage of the works.

In the melting shop two out of the seven 200-ton open-hearth furnaces are now in production, the first furnace as from May 25 and the second as from June 30. Up to June 30, the total quantity of ingots produced was approximately 10,200 tons. The third furnace has also been completed and is now ready for drying out; of the two 800-ton capacity hot-metal mixers the first is completed and in operation and the second is now being bricked.

In the rolling mill plant the 42-in. blooming mill went into operation on May 9; this was followed three days later by the 32-in. intermediate mill. The continuous billet mill went into operation on June 17. Up to June 30 approximately 3,300 tons of blooms had been rolled by the 42-in. and 32-in. mills and between June 17 and 30 approximately 520 tons of 2-in. to 4-in. billets were rolled by the billet mill. The foundations for the 24-in. medium section mill and the continuous merchant mill are completed and erection of the mill stands and ancillary equipment is in progress. Both of these mills are also associated items of finishing equipment and scheduled for completion in April, 1961, as part of the third stage of the works. This will then see the completion of the rolling mill plant and the finished products, such as flats, rounds, joists, and channels, will be available for sale.

The wheel and axle plant is the last stage of the works, scheduled for completion in July, 1961. The greater part of the foundations for both buildings and plant have been completed and erection of the structural steelwork for the building is now in progress. The central engineering maintenance department, the iron and steel foundry, and the power plant were completed as first-stage commitments and are now in operation.

Bethlehem Steel Supplying Vacuum-Cast Rolls

ENTIRE line of hardened steel rolls of the Bethlehem Steel Company is now being produced from vacuum-cast ingots. Reporting this in its July 21 issue, Iron Age states that the prices remain the same as for former air-cast grades.

Two pouring methods are in use. Molten steel is poured into a pony ladle at the top of the vacuum pouring unit, then into an ingot mould; or from the furnace ladle into a second ladle in the vacuum tank. Break-up of the hot metal into small droplets releases hydrogen as well as other gases. Tests show that about 63 per cent. of the hydrogen is removed.

The company says that performances recorded over several years show the superiority of rolls forged from vacuum-cast ingots. Several hundred large rolls were produced and shipped during the test period. They went to both ferrous and non-ferrous industrial users.

OXYGEN TOP-BLOWING PROCESS

(*Continued from facing page*)

cu. ft.) at s.t.p., after cleaning. The current price for the ore fines is decisive for the economy of the process.

The success attained hitherto has led to the planning of a joint installation for all sludge recovery, which is in construction. Whether the same method can be used for the recovery of blast-furnace dust sludge will depend largely on local conditions.

Coal Utilization Research

OUTLINE of the work of the British Coal Utilization Research Association in its efforts to improve the coal industry's competitive position in fuel utilization is contained in the association's annual report for 1959. The objectives include making as nearly automatic in operation as possible industrial boilers and boilers for central-heating buildings such as blocks of flats, improving fuel handling and ash disposal, and minimizing atmospheric pollution due to the emission of smoke, dust, or sulphur.

Research of particular relevance in industrial boilers has been initiated into the mechanical handling of small coal. From tests carried out with a model bunker and with an experimental bucket elevator it has been confirmed that the presence of very fine particles and the high moisture contents to which their presence leads are chiefly responsible for impeding flow.

Grit Emission

Studies of heat transfer to the furnace tube of shell boilers have been continued on a model furnace tube plant and the results compared with measurements made on the Economic boiler at the association's headquarters at Leatherhead. The boiler has also been used for investigations into the effects, on load-efficiency characteristics, of changing the length of the stoker, and of controlling undergate air distribution by fixed vertical baffles. In a study of grit emission it was found that avoiding overloading and keeping excess air to the minimum were of importance in minimizing emission.

A small chain-grate stoker being developed for central heating in buildings such as large blocks of flats has undergone extensive testing. The automatic control system enables coals of differing characteristics to be used, and satisfactory burning at a rate as low as $\frac{1}{5}$ of full load to be achieved when required. Combustion efficiencies of over 75 per cent. are attained over the whole range of burning rates with negligible emission of smoke, dust, or grit. A simple addition to the stoker speed regulator enables the controlled water temperature to be varied according to the outside air temperature and a novel method of withdrawing fuel automatically from bunkers has been developed. A field trial installation of the stoker in a London block of flats has operated satisfactorily; the National Coal Board is arranging for the commercial development of the stoker.

Other work particularly concerned with the promotion of clean air includes the production of data on the domestic emission of smoke from a range of fuels, under a contract placed by the DSIR on behalf of the Ministry of Housing and Local Government, and investigations on the release of sulphur from domestic appliances under an arrangement with the Ministry of Power.

The annual report lists some of the investigational work carried out for individual members. Other fields of work described include:—Research on deposits and corrosion in water-tube boilers; the pulverizing of coal; research on the gasification of low-grade coal under contract with the Ministry of Power; basic studies of the primary products of the thermal decomposition of coal and the mode of combination of hydrogen and oxygen in the coal molecule; the structure and reactivity of graphite used in moderators for nuclear reactors under an arrangement with the UK Atomic Energy Authority; the production from coal and possible future uses of chlorofluorocarbons.

Copies of the report (price 10s.) may be obtained from the Liaison and Publications Officer, BCURA, Randalls Road, Leatherhead (Surrey).

Ventilation Walls in South African Gold Mines

THE accompanying illustration, supplied by Dupré Vermiculite (Exfoliators), Limited, London, E.C.2, shows the use of vermiculite concrete blocks for the building of a stopping in a South African gold mine. The original height was 42 in. when the wall was built; the height

shown is 22 in. The bottom blocks have been compressed from their original thickness of 6 in. to between 2 in. and 3 in.

An unusual feature is that compression normally starts at the bottom and crumbling or "spalling" of the side of the blocks, which does not affect the efficiency of the wall, usually starts in the middle section of the wall.

THE GOVERNMENT of Andhra Pradesh has invited East German experts to investigate the possibilities of establishing a steel plant in the Singareni area. The Government of India has reported that a committee would be set up to examine the material which the State Government has sent to it.

Fewer Fatal Accidents at East Midland Mines

HM Divisional Inspector's Report

FOURTEEN fewer persons were killed in 1959 at collieries in the East Midlands Division of the National Coal Board than in the previous year, states Mr. H. S. Stephenson, HM Divisional Inspector of Mines, in his annual report (Stationery Office, 3s. 6d.) under the Mines and Quarries Act, 1954. Nevertheless, the 1959 figure was 10 more than the average for the preceding three years. Table 1 gives the figures for 1959 and the average for the period 1956-58.

The 88 collieries operated by the East Midlands Divisional Coal Board and the 13 small mines produced 44,877,472 tons of coal last year, compared with 47,741,126 tons in 1958. It is of interest to note, states Mr. Stephenson, that four collieries, Gedling, Bestwood, Kirkby, and Newstead, each produced more than 1,000,000 tons during last year.

Additionally, the output from the four north Nottinghamshire collieries was 1,677,864 tons, compared with 1,715,523 tons in the preceding year. The output per manshift of the collieries in the division rose from 38.38 cwt. in 1958 to 40.02 cwt., the percentage of coal from mechanized faces rising from 48.85 in 1958 to 54.09 in 1959. A vast amount of new and reconstruction work was carried out. Boring operations proceeded at 50 sites, 21 of which were below ground, the deepest hole drilled being 3,045 ft. The total footage drilled during 1959 was 25,734, compared with 30,030 in 1958.

Falls of Ground

Eleven persons were killed and 97 seriously injured in accidents from falls of ground, representing 45.6 per cent. of all killed or seriously injured, compared with 22 killed and 96 seriously injured in the preceding year. Although the number of fatalities was the lowest on record, it nevertheless represented 50 per cent. of the number of persons killed from all causes, and the number of accidents in which persons were seriously injured was almost the same as in 1958.

Falls of Roof at Working Face.—Six persons were killed and 29 seriously injured, compared with 11 killed and 33 seriously injured in 1958. Although the majority of workmen appear to understand that supports in wastes and at waste edges should only be withdrawn by means of suitable devices, some appear to forget that it is not only desirable, but a statutory requirement, that no support shall be withdrawn from any place other than by a method or device which enables the withdrawal to be effected from a safe position. Unfortunately, suitable withdrawal devices are not always properly used. It has frequently been said, that accidents rarely occur from roof which is obviously weak because steps are taken to secure it, but more often by falls from ground which appeared to be sound, giving a false impression of security and a consequent delay in support. It cannot be stressed too strongly the danger of a workman relying on his own judgment, no matter how experienced he might be. In all cases adequate support should be provided as soon as practicable.

Apart from delay in setting permanent supports, there is also evidence of delay, and in some cases neglect, in the setting of temporary supports. The reason for delay in some instances—particularly on hand-filled faces—is that so long as the conveyor is running, there is a great temptation to workmen to load coal, leaving the setting of supports to be done later. On power-loaded faces failure to set temporary props frequently results from the assumption that they are unnecessary because the erection of permanent supports is likely to follow very quickly. Such an attitude should be vigorously discouraged, states the inspector. Managers should bear in mind, however, that it is unreasonable to expect workmen to comply with the requirements as to the setting of temporary supports, if they are not of a suitable type. The main

TABLE 1.—*Persons Killed or Seriously Injured in Mines of Coal during 1959, Compared with the Average for 1956-58.*

Classification of accident.	Killed.		Seriously injured.	
	1959.	Average 1956-58.	1959.	Average 1956-58.
Underground.				
Falls of ground:				
(*a*) Falls of roof at face ..	6	8.7	29	26.7
(*b*) Falls of face or side ..	1	3.4	40	27.7
(*c*) All other falls	4	11.6	28	25.9
Total falls	11	23.7	97	80.3
Haulage and transport	5	8.3	58	47.7
Miscellaneous causes	5	8.7	38	39.0
Total underground	21	40.7	193	167.0
,, surface	1	3.6	22	16.0
Underground and surface ..	22	44.3	215	183.0

characteristics required of them is that they should be relatively light, capable of carrying the necessary load, and be easy to set and withdraw.

Falls of Face or Side.—One person was killed and 40 seriously injured by falls of face and side, compared with three killed and 38 seriously injured in 1958. Almost all the accidents resulted from falls of cut coal, although the distribution as between power-loaded and orthodox faces is different from the preceding year. The number of these accidents on power-loaded faces was reduced by about one third, with a corresponding increase on orthodox faces. In his report for 1958 the inspector stressed the desirability of having a satisfactory ploughing arrangement which would eliminate the necessity for persons to work on the face-side of the conveyor. He regrets that even after a year, he is unable to report any real progress in this connection. If workmen cannot be kept from these areas of risk, there can be no alternative but that of providing adequate support to the coal face. In attempting to do this, nogs inserted in the cut cannot be regarded as entirely satisfactory, as they offer little resistance to the outward movement of the face. Trials of a sprag are now being made in the division; it is made by an engineering firm. This sprag consists of two tubular steel members hinged together, with a backing plate at the connection. One end is set to the roof, the other to the floor, and a cam-operated device forces the hinged backing plate against the coal face. Any lateral movement of the face tends to tighten the sprag. The whole is relatively light, easily set, and results of pit trials are awaited with interest.

Falls at Roadheads.—Two persons were killed and 16 seriously injured by falls at roadheads, compared with five killed and 15 seriously injured in 1958. Although there is no very marked reduction in accidents from this cause, it should be remembered that the figures for 1958 were considerably better than the average for the preceding three years. There were no instances of accidents from falls of ground resulting from mechanical failure of supports. In the roadhead areas support is invariably by arched steel girders outbye the ripping lip and straight steel girders or bars set on chocks or props between the ripping lip and the face. Falls of roof occur principally for one of three reasons; instability of support, insufficiency in the number of supports, and failure to erect supports quickly.

The setting of bars on chocks, and the use of tie-rods to give increased stability, might have prevented falls which caused the death of one man and serious injury to another. Examples of insufficiency of supports are most frequently found at ripping lips; two persons sustained serious injury by falls from ripping faces, the support of which was quite inadequate.

The difficulties in obtaining immediate and effective support following ripping operations are well known and during the year Mr. R. A. Ridsdale, District Inspector for Special Duties, made a time study at 16 roadheads. Among the greatest risks disclosed by this study was that of removing and re-erecting the lip-edge girder, and it was obvious that any system of support which would be equally effective without a lip-edge girder, would be welcome. With this in mind, a system of support was put into operation at a south Leicestershire colliery recently.

Adequate and immediate support to the roof and sides exposed by ripping operations is another problem, as the presence of large quantities of debris on the floor of a roadway prevent the early erection of arched steel girders. The inspector has been surprised and pleased at the enthusiasm with which this problem has been tackled, the general line of thought being to provide receptacles capable of accepting the ends of the girders, these being placed in position before the ripping is brought down. The receptacles are of robust design to withstand the shock of debris falling about them and after the ripping has been fired, they stand clear of the mound of debris so that the girder section can be inserted before the debris is moved. The use of machinery designed to perform operations which would otherwise carry a high degree of man-risk, is always worthy of close consideration. In this connection reference is made to trials which are being conducted in the division with a ripping machine. Although this machine is still in its initial stages of development, the results so far are promising.

Haulage and Transport Accidents

Accidents from haulage and transport were responsible for 26.6 per cent. of all killed and of seriously injured, the former numbering five and the latter 58, compared with 10 and 59, respectively, in 1958. While, states the inspector, one must feel grateful to find even a comparatively small reduction in the number of accidents, the position is far from satisfactory.

The results were all the more disappointing for the year under review because the very welcome reduction in the number of accidents due to the use of mechanical haulage and conveyors was marred by a marked increase in those connected with hand, horse, and gravity haulages. Of those in the latter category it is significant that seven, of which two proved fatal, occurred at spacious, well-equipped, and well-lighted pit-bottom landings where very young as well as aged persons are generally employed. Indeed, one of the two fatal accidents occurred to an elderly workman, while the other fatality involved a youth who failed to use a coupling block when attempting to couple a moving set of 24 full tubs to a set held by retarders.

There were two killed and 18 seriously injured from the use of conveyors, compared with two killed and 28 seriously injured during the preceding year. Of the two fatal accidents one occurred when a stablehole man was passing a 5-ft. long link bar across a moving chain conveyor and was struck a violent blow when one end of the bar caught a conveyor flight. The other occurred to a faceman who was resetting a long girder at the

roadhead, and a large piece of coal on the moving face conveyor displaced an adjacent girder which swung across and pinned his head between the two girders. Accidents of this type appear to be due either to failure on the part of workmen to appreciate the dangers involved, or to reluctance to stop the conveyor. Several of the accidents which resulted in serious injuries were due to the unexpected movement of conveyors and might easily have been avoided if the persons concerned had been made aware of what was happening. Twenty-one persons were seriously injured from the use of mechanical haulage during the year, this being a reduction of one on the 22 injured in 1958.

At the end of 1959 the total length of face open was 118,740 yd., compared with 125,037 yd. in 1958. Of this, 68,674 yd. were cut by ordinary longwall machines, and 288 power-loading machines operated on 52,233 yd. Of the total length of face opened, 92,392 yd. received some form of dust-suppression treatment and, although the length of face where wet cutting was practised increased from 78,613 yd. in 1958 to 86,860 yd., there was a reduction in the length of face infused by water from 6,021 yd. in 1958 to 4,078 yd. The percentage of coal face on which dust conditions were approved increased from 88.65 in 1958 to 89.57 in 1959.

Faces on which power-loading machines operated continued to present the greatest problem in dust control. At the end of the year on about 13 per cent. of the total length of these faces, conditions were not satisfactory. During the year experiments were made using water as the suppressive medium on a number of different types of power-loading machines, but the success was very limited and the problem remains difficult. The use of hoods on those machines which produce a high fragmentation of the mineral was not extended to any great degree, but manufacturers and mining engineers have made some progress in the development of machines to reduce fragmentation and these should play a complementary part in the reduction of airborne dust.

Towards the end of the year tests on the possibility of deep-hole infusion had begun, but at the time of writing these were only in the initial stages. Some contribution to the reduction of dust likely to become airborne has been made by the use of water ampoules in shotholes and there is every indication that this practice will be greatly extended. All roadway conveyor loading and transfer points were equipped with water sprays and approximately 353,000 yd. of roadway were treated either with water or with water with chemical agents.

Book Review

Black Avalanche. By Arthur and Mary Sellwood. Frederick Muller, Limited, 110, Fleet Street, London, E.C.4. 16s.

THE Knockshinnoch Castle Colliery disaster which occurred just 10 years ago brought tragedy and sorrow to the township of New Cumnock in the County of Ayr. The disaster arose from a sudden inrush of peat or moss into the underground workings of the mine. There were 135 persons at work underground at the time. Of these, six escaped quickly to the surface, 13 were caught by the avalanche of mud and lost their lives, and 116, with all means of escape to the surface cut off, were trapped in the inbye workings of the mine.

Scotland has had more than its share of mining disasters due to inrushes of peat or moss. One recalls the disaster at Donibristle (Fife) in 1901, and that at Stanrigg (Lanarkshire) in 1918. The rescue of the trapped men at Knockshinnoch in 1950 was truly an epic in the long history of mine rescue operations. At the time, the grim struggle gripped the imagination of countless numbers of people in this and other countries.

"Black Avalanche" tells the fascinating story of this disaster and of the intensely exciting process of the rescue, stage by stage, of the 116 trapped men. In particular, it tells of the human reactions of many of those directly concerned in the rescue operations—the reactions of those who planned and carried them out and, more especially, of those of the trapped men and of members of their families and friends who were so anxiously awaiting their rescue and return home. And it tells the story in such a human and imaginative way that it cannot fail to hold its readers, most of whom will find the book difficult to lay down before finishing.

Although the book is written by authors—a journalist and his wife—without mining experience, and deals with events in an environment that must be strange to all but mining people, nevertheless, the story is so clearly told and its background so vividly and accurately portrayed, that no reader should find difficulty in reading it—a truly remarkable achievement for non-technical authors.

The raw material for the book has come mainly from actual participants in the drama, and so the authors, from what was told them by those who were there at the time, are able to record what it was really like.

While mining readers may feel that, in relation to the primary cause of this disaster, rather too much importance is attributed to the omission of the symbol for peat on a sketch plan and to an increase in the amount of water that entered the workings from the surface just prior to the inrush of peat, there is in this book—a commendable feature in a book of this genre—no attempt on the part of the authors to "instruct" in the rights or wrongs of mining practice. They do not attempt to ascribe blame, to occupy a pulpit, or to tamper with the facts to suit a point of view. It is unfortunate therefore that the blurb in the "jacket" should suggest—what is certainly not true—that never has there been a disaster to compare in terms of human error with that which occurred at Knockshinnoch in the very wet September of 1950.

But to complain is perhaps to be hypercritical. Of "Black Avalanche" it is safe to say that it is a worthwhile story well told, a story that offers several hours' reading that cannot fail to grip the imagination.

New Literature

NEW catalogues, booklets, and other publications which have recently been received include those mentioned below. Readers wishing to obtain a copy of any of the publications referred to should apply direct to the address given, at the same time mentioning IRON AND COAL.

DELORO STELLITE, LIMITED, Highlands Road, Shirley, Solihull (Warwickshire)—The uses of "Stellite" alloys in many fields are outlined in a new brochure. The examples are well illustrated.

CROSSLEY BROS., LIMITED, Openshaw, Manchester 11—Crossley engines have provided power at Epsom Waterworks since 1907. The installation is described in Crossley Chronicles (No. 214).

BRITISH COAL UTILIZATION RESEARCH ASSOCIATION, Randalls Road, Leatherhead (Surrey)—The eighth Coal Science Lecture, "Coal: a Colloid and a Chemical," by Sir Eric Rideal, FRS, is printed in the BCURA Quarterly Gazette (No. 39).

ELECTRIC RESISTANCE FURNACE COMPANY, LIMITED, Netherby, Queens Road, Weybridge (Surrey)—Heat-treatment furnaces are the subject of the company's latest brochure, which illustrates a representative selection of the many designs of EFCO furnaces.

RESEARCH & CONTROL INSTRUMENTS, LIMITED, 207, King's Cross Road, London, W.C.1—Latest information about Philips stud-welding equipment is contained in a leaflet (RCL 5909), which outlines the main features of the technique and illustrates a typical application.

HENRY WIGGIN & COMPANY, LIMITED, Thames House, Millbank, London, S.W.1—Gas-carburizing furnaces using Incoloy DS, nickel-chromium-iron alloy, for the retort containing the carbon rich atmosphere is the subject of an illustrated article in the latest edition (No. 57) of Wiggin Nickel Alloys.

DEMAG AKTIENGESELLSCHAFT, Abteilung VI, Duisburg, Wolfgang-Reuter-Platz—Articles on "The Basic Bessemer Steelworks of Hüttenwerk Salzgitter AG," "Combination Wire Rod, Small Section, Strip, and Skelp Mill," and "Measures to Increase Productivity in the Ramsbeck Ore Mines" are to be found in the latest (No. 157) issue of Demag News.

TEES-SIDE AND SOUTH WEST DURHAM CHAMBER OF COMMERCE—More than 5,000 tons of Tees-side steel is being used in the construction, by Dorman Long (Bridge & Engineering), Limited, of an impressive giant-arched bridge spanning the Mersey. An article on the new bridge is among the features of the August issue of the Tees-side Journal of Commerce.

SAMUEL FOX & COMPANY, LIMITED, Stocksbridge Works, near Sheffield—At 3d. for a copy, the Fox Magazine is indeed good value. The summer number carries many pages of news and photographs in addition to a number of interesting articles. The appearance of the features, however, might perhaps be made more attractive by the introduction of larger type for headings and more generous spacing.

HEAD WRIGHTSON & COMPANY, LIMITED, Teesdale Ironworks, Thornaby-on-Tees (Yorks)—A recent agreement between the Belco Industrial Equipment Division, of New Jersey, USA, and Head Wrightson Processes, Limited, London and Yarm, enables the latter to offer Belco water-treatment processes. A booklet is available giving a brief description of the processes offered in the field of water demineralization and a general guidance to the application of each process.

EUTECTIC WELDING ALLOYS COMPANY, LIMITED, North Feltham Trading Estate, Feltham (Middx)—A revised edition is now available of the company's maintenance welding data book, which contains interesting articles on the history, development, and correct application of the complete range of over 150 Eutectic low-temperature welding alloys and fluxes. Full technical data are given on each one, together with diagrams showing correct techniques, joint designs, etc.

POWELL DUFFRYN, LIMITED, Powell Duffryn House, Cardiff—The P.D. Review has long been esteemed as one of the best of the magazines emanating from the industrial field. The summer number contains interesting articles on the "P.D. Group Contribution to Atomic Energy," in which developments at Powell Duffryn Carbon Products, Limited, Hayes, are described, and "Tailored Central Heating," while No. 114 in the "Around the World with PD" series is concerned with Canada.

FEDERAL CHAMBER OF FOREIGN TRADE, Beograd, Knez Mihajlova 10, P.O. Box 47—No effort is spared to make Commercial Information, a monthly magazine, attractive, and full marks are awarded to those responsible for its production. The July issue includes "The 'Metalna' Factory of Maribor Produces Engineering and Steel Products," an article to mark the 40th anniversary of the "Metalna" works. The development of Yugoslavia's power economy is dealt with in another feature.

JAMES NEILL & COMPANY (SHEFFIELD), LIMITED, Napier Street, Sheffield 11—Although magnetic chucks have been known to the engineer for many years, the lack of technical information on the subject of magnetic work-holding has prevented the fullest exploitation of these aids to production. The company's "User's Handbook" therefore fills a very useful purpose. It deals not only with the design and manufacture of permanent magnet chucks but also with the many different aspects of magnet work-holding in order to obtain maximum results from the various items of equipment available. The booklet is conveniently arranged in three sections.

METAL-CASED BRICK PATENTS ARRANGEMENT

SOLE licensee for the manufacture and sale in Britain of metal-cased basic bricks produced under the Neuer Patents, General Refractories, Limited, has decided that in view of the substantial increase in the demand for these bricks, especially in connection with the development of the all-basic furnace, it is in the national interest that the patents should be made available to other manufacturers. General Refractories sells the bricks under the trade name "Ferroclad."

The company has now made arrangements whereby Pickford Holland & Company, Limited, will be entitled to manufacture metal-cased bricks under these processes and which it will market under its own name of "Metalclad."

Internal Defects in Steel

Service and Inspection Experience

Typical instances of metallurgical defects in service, including some that did not cause failure, are discussed by G. P. Smedley, B.Eng., B.Met., of Lloyd's Register of Shipping, in a paper contributed to the recent symposium on "Internal Steel Quality and Methods of its Assessment" arranged by the West of Scotland Iron and Steel Institute. Numerous examples of failure are illustrated and inspection problems discussed. The following is a summary of the paper.

STANDARDS of steel acceptance, whether wrought, cast, or a weld deposit, are associated with the engineering importance of components and service stress. Cast steel is, in general, considered weaker and more prone to defect than wrought material. For the same application therefore, minimum scantlings of cast-steel parts are greater than those of similar wrought-steel components irrespective of casting considerations and minimum specified tensile properties. This still applies in British practice.

In applications involving other than low levels of alternating or repeated stresses, wrought steels are preferred. Specifications require that all steels shall be free from harmful defects, but there is no reliable criterion for assessing the degree, size, shape, and location of defects that can be tolerated in particular components. It is usual to err well on the side of safety and acceptance is therefore based on the qualities that can be expected from good practice in steelworks, forges, mills, foundries, and welding shops.

Degree of Inspection

The degree of inspection is related to the service conditions and in many instances is limited unless doubt exists regarding soundness. Limited inspections are generally applied to low-stressed parts or parts subjected to non-uniform stress distribution. Maximum stress usually arises at exposed surfaces readily examined. Moreover, manufacturers can frequently position doubtful material in regions of very low stress; for example, the centre line of the ingot on the axis of a forging subjected to torsional and bending stresses.

The number of engineering components which fail yearly, in service, is fairly large, but most of these failures are due to faulty design, poor workmanship, and severe operating conditions. Defective material is responsible for a relatively small proportion; most of these originate at defects in the surface of components. Very few of these failures can be attributed to internal steel defects. On the other hand, serious internal defects in steels have been exposed during machining, while others escaping inspection have been of serious concern to builders, causing delays in replacing affected parts, in addition to higher fabrication and machining costs.

Service defects or failures may be considered in five main groups:—(1) Major defects present in components which did not cause failure during service; (2) defects that caused failure during overload during routine test or abnormal operating conditions; (3) failures originating at steel defects, but which may not have been the primary causes of the failures; (4) failures that can be attributed solely to defects in steel; and (5) failures due to inefficient rectification of surface defects by welding resulting in detrimental sub-surface imperfections and in welds that have root defects.

After describing many examples of service defects drawn from the records at Lloyd's Register of Shipping and relating to steel made and treated in many parts of the world the author discusses inspection considerations.

Some Inspection Considerations

True quality control of steel starts at the design stage of components and is also concerned with the method of manufacture. First concern is the selection of the steel. Frequently a steel has been chosen either on a low-cost basis or of higher strength than necessary to obtain a superior design factor of safety or reduced scantlings. Unfortunately, either fabrication difficulties or service failures have followed and more appropriate steels have solved these problems. With few exceptions steels which were associated with service failures of forgings and were subsequently changed, were of 0.4 to 0.6 per cent. plain carbon types. These were discarded in favour of either lower carbon steels or a low-alloy steel.

From the steelmaking point of view, the 2½ to 4 per cent. Ni or Ni-Cr-Mo steels have advantages over the 3 per cent. Cr-Mo types, and this can be reflected in soundness. Although the type of steel is equally important for a casting, the design of the cast part and location of headers, risers, and chills can be of greater consequence. This has been appreciated by many users of castings and there has been a trend for increased consultations between designers and founders. The benefit has been reflected in improved quality and soundness of the product.

Experienced welding firms should also be permitted some latitude in the design of weldments, particularly in regard to the locations and types

of welds, methods, and sequence of welding and choice of electrodes. The quality of fabrication and welding depends on the experience of the firm in the thickness and type of steel concerned. As in other metallurgical industries, this is also governed by the degree of control and supervision. It is for these reasons that Lloyd's Register instituted a system of approving manufacturers of Class I fusion-welded pressure vessels and recently amended the terms of approval to include plate thickness and grade of steel.

X-radiography has been used to determine the soundness of buttwelds for well over 25 years. However, the sectioning of welds is still a widely adopted method of obtaining some indication of these characteristics. The destructive technique is applied to trial and test welds. It is always advisable to polish and etch sections for macro- and microscopical examinations to ensure freedom from detrimental defects and structures. Sectioning is also employed for small castings which are produced in quantity and as part of the procedure of the approval of foundries. For some butt-welded seams the nick-break bend test is the method of checking internal quality. The test is applied to the weld metal of a sample and mainly shows lack of fusion, porosity, blowholes, and slag.

The appearance of fractured routine mechanical testpieces such as tensile, impact, and, sometimes, bend testpieces, can serve as a guide to the qualities of the associated materials. The author recalls an instance in which the appearance of the fractured tensile and impact testpieces alone condemned a forging. The mechanical properties met the agreed specification and the forging passed inspection, but the fractured testpieces showed that the steel had been grossly overheated in the forge. Fissures are other features that can be revealed by the tests. However, some experience is required to assess the characteristics of the fractured specimens, for fissures in the fractures of the broken tensiles of certain wrought austenitic steel sections do not necessarily indicate defective quality. Such fissures can be found in similar fractures of many good-quality wrought metals and alloys that have high strengths, or were tested at very low temperatures when the materials displayed such strengths.

Instances of Doubt

A large number of marine forgings are accepted by survey authorities on visual examinations and satisfactory forging reductions, discards, and mechanical tests. However, in instances of doubt any of the recognized proving methods, that is, radiography, acid etching, magnetic crack detection, ultrasonics, etc., may be requested to permit a more detailed assessment of the conditions. Some forgings are stressed in service in regions in which the material may be suspect. A turbine rotor is included in this category as service stresses are high at the longitudinal axis. To facilitate surface inspection in this region rotors are hollow-bored. The bores must have a good finish and be thoroughly clean to detect and differentiate inclusions by boroscrope examinations. Irrespective of survey requirements most forgemasters and/or turbine builders test these forgings ultrasonically. As a result of their experience some small h.p. turbine rotors are now accepted on the basis of ultrasonic tests, no boring being required. This has proved most useful as an alternative to the blind boring of rotors with small-diameter forward-end journals.

From the examples of internal defects in steel components it is obvious that some failures due to these faults might have been avoided if:— (1) The inspection at the manufacturing stage had been more rigorous; for example, ultrasonic testing of crankshafts, etc., to detect internal bursts, etc.; (2) an alternative steel had been selected, for example, a low-alloy steel (Ni, Ni-Cr-Mo, or Cr-Mo type) instead of 1 per cent. Mn, 1 per cent. Si type for certain gearwheel rims; (3) the component had been made of wrought instead of cast steel, namely, forged steel transverse beams instead of castings; (4) if better practices had been adopted during manufacture, rectification, and repair.

In most of the instances quoted in the paper, steps were taken by the particular manufacturer or user, and where necessary inspection requirements amended. An important factor is that the efficient use of ultrasonic testing equipment could have prevented many of the defective components from entering service. However, it must be emphasized that breakdowns due to defective steel are very small in proportion to those arising from other causes. Also, the seriousness of internal defects depends on the size, number, shape, orientation, location, and level and type of stress. Ultrasonic inspection must therefore be applied with intelligence, but as pointed out in a recent review of the application of this testing method to buttwelds in thick plates, uncertainty regarding the nature of the defects revealed should not influence the decision to employ the test.

Joint British Committee for Stress Analysis

FORMATION is announced of a Joint British Committee for Stress Analysis. The committee will represent the interests of Great Britain in the field of stress analysis at the periodic meetings of the Permanent Committee which are held in Europe and will thus ensure adequate British participation in international conferences in the field of stress analysis.

The Joint British Committee consists of representatives appointed by the Royal Aeronautical Society, the Institution of Civil Engineers, the Institution of Electrical Engineers, the Institute of Marine Engineers, the Institution of Mechanical Engineers, the Royal Institution of Naval Architects, the Institute of Physics, the Physical Society, the Institution of Structural Engineers, and the Institute of Welding.

THE SIXTH in the series of international conferences on hot-dip galvanizing is to be held in Switzerland—at the Kursaal, Interlaken—from June 4 to 9, 1961, and not in France as previously announced.

Metallurgical Patents in the US

Some Recent Inventions

DESCRIPTIONS of metallurgical patents given below have been taken from details given in the Official Gazette of the United States Patent Office.

Machine for Making Moulds for Centrifugal Castings

A moulding machine comprises a moulding cylinder supported on the machine and a tubular diaphragm made of flexible material and disposed in the moulding cylinder. The ends of the tubular diaphragm are attached to the ends of the moulding cylinder in which a pattern is disposed in alignment with the flask. Means apply pressure to the diaphragm whereby it is forced against the surface of sand adapted to be disposed in the moulding cylinder, compressing the sand into engagement with the pattern, means being provided for forcing the compressed sand into the flask.—2,937,421.

Build-up Welding

A process of build-up welding of a metallic object comprises the steps of supporting the object for linear movement, positioning above and in contact with the object a body of graphitic carbon to constitute an extension of the object and a disposable dead head, providing a high-temperature welding zone including a pool of molten material around the path of movement of the object, which is moved at a controlled speed and without interruption into and through the pool of molten material while continually replenishing the same and continuing the downward movement of the object with the bottom support for the pool until at least a predetermined portion of the body has passed through the welding zone and is coated with the material. Upon termination of the welding operation any possible faults are concentrated in the junction between the coating and the dead head. The object including the material welded thereto is gradually cooled after passage through the welded zone.—2,937,422.

Moulding Apparatus

A moulding apparatus comprising a cradle, an assembly comprising an elongated flask, bearings adjacent the respective ends of the flask in which the flask is rotatably mounted and means fastening together the flask and bearings so that they are handleable as a unit into and out of the cradle. The cradle has means for receiving the assembly so that the bearings are mounted in the cradle with the flask rotatable in the bearings. Means forming part of the apparatus are disposed locally adjacent the respective ends of the assembly only, fasten the assembly to the cradle and are adapted to be rendered inoperative to permit bodily separation of the assembly from the cradle.—2,937,423.

Production of Castings and Ingots

An exothermic composition for use in the production of steel ingots and castings consists essentially of a mixture of 15 to 30 per cent. aluminium and 45 to 84 per cent. iron oxide, calculated as Fe_3O_4, the said mixture containing, based on the weight of the aluminium, 1 to 8 per cent. of copper and 0 to 4 per cent. of nickel, the ratio of iron oxide, calculated as Fe_3O_4, to aluminium being within the range of 3.3:1 to 4:1.—2,937,425.

Ingot Mould Made of Spheroidal Graphite Cast Iron

Ingot mould for steel ingots and other ferrous alloy ingots, characterized by the mould being composed of spheroidal graphite cast iron and by a ratio

$$\frac{V_1}{V_2}$$

between the volume V_1 of the mould side walls and the volume V_2 of the mould cavity between 0.79 and 0.4.—2,937,424.

Process for the Cold Reduction of Strip Metal

A process of cold reduction of strip metal, includes coating the metal prior to passing it between reducing rolls with a rolling oil containing a lubricant selected from the group consisting of fats, oils and greases of non-drying and semi-drying characteristics heat treated at a temperature ranging from about 200 deg. to about 500 deg. F. for about 6 to about 72 hr. and having a viscosity of from about 200 to about 500 Saybolt Universal seconds at 100 deg. F. and a pour point from about 0 deg. F. to about 85 deg. F., the lubricant being stable at high cold-metal reduction speeds.—2,938,262.

Slag Car Construction

A slag car construction adapted to receive molten slag and release it without undue adhesion comprises in combination: a steel plate defining a floor; steel side and end plates affixed to and upstanding from the floor to define a receptacle; a series of upstanding steel angle bars affixed at their spaced edges to the inside faces of the side plates in close adjacent relation and in good heat-transfer engagement with the adjacent side plate over the entire length of each angle bar, the angle bars each extending from the floor to the top edge of each side plate and covering substantially the entire surface of inside faces to define a corrugated inside surface against which the molten slag rests, whereby the slag is rapidly cooled by the action of the angle bars and side plates and at the same time cooled differentially so that internal stress is set up in the slag to minimize adhesion to the angle bars.—2,938,717.

Ingot Mould and Method of Making

A method of forming a tapered metal tube to render it suitable for use as an ingot mould consists in heating a substantially parallel-walled heavy-gauge copper tube of the length desired for the mould to a temperature below the melting point of the metal, but sufficiently high to cause the tube to expand circumferentially, removing the tube from the heat and inserting a tapered and relatively cool steel mandrel into the open end

of the heat-expanded tube in intimate contact therewith as far as it will go. The mandrel is of such size and mass in relation to the heavy-gauge copper tube that it absorbs heat from the tube causing it to expand slightly then allowing the heat-expanded tube to air cool on the tapered mandrel for a selected period and in cooling shrink on and conform to the tapered surface of the mandrel simultaneously transferring part of its heat to the relatively cool steel mandrel so that the temperature of the latter approaches the temperature of the copper tube during the air-cooling period. Both tube and inserted mandrel are then immersed in a liquid quenching medium to arrest the shrinking of the tube and thereafter to extract absorbed heat from the mandrel whereby to cause the latter to contract slightly and to free itself from the walls of the tube, then removing the tube and mandrel from the quench medium and withdrawing the tapered mandrel from the correspondingly tapered tube.—2,938,263.

Shell Moulding Process and Means

In a shell moulding process, the steps comprise inserting a shell mould into an invertible mould box through a bottom opening therein while the mould is in inverted position, filling the lower part of the mould in position with backing material while supporting it intermediate vertical extremities of the box, closing the bottom opening, inverting the mould box, filling the upper part of the box above the mould with backing material through a top opening therein, and pouring molten metal into the mould. The mould is then moved to a dumping station, and dumped in sequence the contents of the lower and upper parts of the box falling into apparatus, for separating the contents for recovery of the casting and re-use of the backing material.—2,940,140.

Centrifugal Casting of Tubular Metallic Bodies in Hot, Permanent Moulds, and Method of Manufacturing such Moulds

A hot permanent mould for the centrifugal casting of tubular metallic bodies comprises, a mould portion and an entrant extension portion, the mould portion being formed as an elongated tubular member with an internal bore extending therethrough, the extension portion being formed for the introduction of molten metal into bore of mould portion. The extension portion is formed integrally with the mould portion and has a conical bore therethrough co-axial with respect to the bore of the mould portion, the conical bore forming in integral continuation of bore of the mould portion. The conical bore converges in a direction away from the bore of the mould portion its greatest diameter being less than the diameter of the bore of the mould portion.—2,940,141.

Mould Assembly

A mould assembly comprises a plurality of mould sections arranged in superimposed relationship and co-operating to provide horizontal casting runners and a plurality of mould cavities of lesser diameter than the width of the corresponding one of the runners and aligned vertically beneath them within the vertically projected extent thereof. A relatively thin, plate-like core member is removably carried by each of the mould sections except the uppermost, each core member having a plurality of openings therethrough communicating with the corresponding mould cavities directly beneath. The upper end of each of the openings is enlarged and has a diameter substantially equal to the inner diameter of the corresponding mould cavity, the lower end of each opening providing a restricted opening into the open end of the cavity.—2,940,142.

Method for the Centrifugal Continuous Casting of Metals

A method for the centrifugal continuous casting of steel in a mould consists in interposing a ring of molten metal heavier than steel between the steel and the wall of the mould, wherein the ring of molten metal is formed by adding small quantities of molten metal to liquid steel poured into the mould. The diameter of the centrifuged circular piece is regulated by varying the rate of addition of the heavy metal to the steel.—2,940,143.

Charging Electric Furnaces under Operation

An arrangement for charging an electric furnace under operation, is evacuated or filled with inert gas, the crucible being surrounded by a vacuum or gas-tight container, attached in a vacuum or gas-tight manner to a charging container, which in turn is joined in the same manner with a storage bin containing a charging basket divided into a plurality of compartments each having a bottom door, the opening and closing of the doors being operated by a ball manœuvring means adapted for opening the doors in both an arbitrary sequence and practically simultaneously. The ball manœuvring means comprises a guiding tube inserted centrally into the charging basket and supporting a crown of radially movable balls, the number of which corresponds to the number of bottom doors, and a liftable and rotatable shaft in the tube having a recess for receiving only one ball and a ring slot for receiving all the balls.—2,940,620.

Furnace Hearth

A furnace for heat treating material includes openings for the continuous passage of material along a substantially horizontal hearth comprising a frame having pairs of crossbars, a plurality of plates with fixed and free ends with their free ends overlapping the fixed ends of the next plate in shingle like fashion to permit free longitudinal expansion. Each plate is provided with a generally Z-shape lip at its fixed ends extending over the pair of bars and beneath the other of the pair of bars being moved to and from the secured position only with the free end of the plate lifted away from the frame a substantial distance.—2,940,743.

Smelting Furnaces

A smelting furnace comprises means providing two smelting chambers arranged in end to end relation each of which is oscillatable independently of the other, heating means for each chamber being located adjacent the outer end thereof. Provision is made for returning a portion of the hot gases generated by the heating source from adjacent the inner end of each chamber to the outer end thereof for recirculating through the chamber. Means adjacent the inner ends of the chambers conduct a portion of the gases from the chamber being heated through the other chamber to preheat its contents. A stack is provided and means for optionally connecting it to the returning means of each chamber.—2,940,744.

Supporting Means for Furnace Charges

A supporting device for furnace charges comprises, in combination, a supporting base, a plurality of composite posts mounted on the base and adapted to support material to be heated in a furnace. Each com-

posite post comprises a lower tubular post portion fixedly secured to the supporting base, a cylindrical insert member mounted within the lower tubular post portion and projecting upwardly therefrom, an upper tubular post portion having a thickness about the same as that of the lower post portion separably and rotatably mounted in abutting relation on the lower post portion and impaled on the cylindrical insert member, the clearance between the insert member and post portions being less than the thickness of the post portions, the top of the upper post portion being above the insert member. Particulated heat insulating material on the supporting base occupies the space between the composite posts to a predetermined level above the lower post portion, the separation of the upper and lower post portions being substantially closer to the predetermined level than to the supporting base. An outer tubular member is arranged about each composite post covering the abutting joint of the upper and lower post portions, the upper post portion being readily upwardly removable away from the lower post portion and out of the outer tubular member. The heat insulating material and metal plate rests on and extends across the top of the upper post portions and form thereon a supporting surface bridging the tops of composite posts.—2,940,745.

GIANT STRIPPING SHOVEL FOR UNITED STEEL

SHORTLY to tower over the equipment busily engaged at the open-cast iron-ore mine of the United Steel Companies, Limited, at Colsterworth, near Grantham (Lincs), will be a 2,000,000-lb. Marion stripping shovel, which is being supplied by Blackwood, Hodge & Company, Limited, Northampton. It will, it is claimed, be the largest stripping shovel in use outside the American Continent. It has been designed by the Marion Power Shovel Company, of Marion, Ohio. Part of it will be constructed by the designers and part by Babcock & Wilcox, Limited, at its Dalmuir Works. All assembly on site will be carried out by Blackwood, Hodge.

The type 5323 will cost approximately £500,000. The machine will move 600 yd. of earth per operating hour. The machine will operate a 17-cu. yd. dipper on a 145-ft. boom and will have a maximum cutting radius of 148 ft. 6 in. and a dumping height of 104 ft. 3 in. Power for hoist, swing, crowd, and propulsion is provided by a single 900-h.p. a.c. motor driving d.c. generators. All operating control equipment is grouped in the operator's cab and arranged for one-man operation.

The machine stands on four pairs of Crawler tracks; these are located on each of the four corners of the lower frame. Some idea of the excavator's immense size can be drawn from the fact that each of the eight tracks has a width of 3 ft. and a length of 15 ft. 8 in. A single track shoe weighs 380 lb.

The pairs of tracks are mounted to the lower frame by way of hydraulic jacks. The jacks automatically ensure that the machine remains on an even keel when operating and travelling over uneven ground.

THE MARION STRIPPING SHOVEL IN OPERATION.

FOUR CEYLONESE will assist the Soviet experts who are now preparing the project report for Ceylon's iron and steel works. Following the investigations Soviet experts carried out in Ceylon last year on matters connected with this works, the Ministry of Industries, in consultation with the Ministry of Finance, entrusted to the Soviet experts the preparation of the project report.

TRADE WITH KOREA

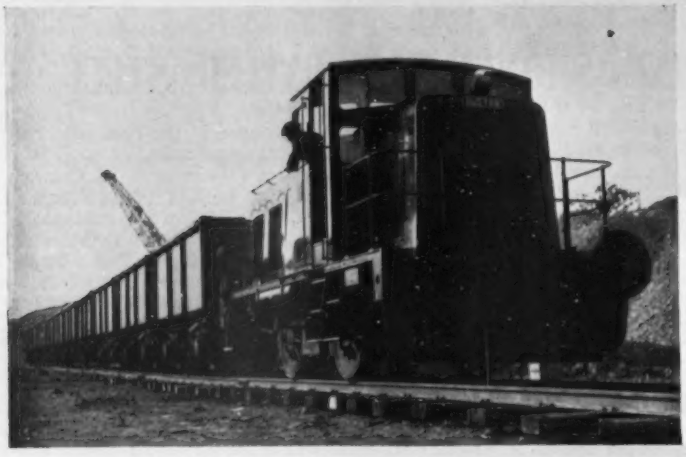
THOSE interested in furthering their trade with Korea will find the 1960 edition of the Korean Trade Directory of great help.

Printed and published in Seoul, the directory contains extensive information on Korea's imports and exports and lists the firms directly concerned. Among the imports are iron and steel products, mining machinery and equipment, and many other types of industrial machinery. The directory contains well over 700 pages and is handsomely bound.

Copies of the directory are available from the Korean Traders' Association, 123, 2-KA, Namdaimunro, Chung-Ku, Seoul.

New Shunting Locomotive

INCORPORATED in a new diesel-hydraulic shunting locomotive recently demonstrated by Ruston & Hornsby, Limited, Lincoln, is a torque converter by British Twin Disc, Limited. The locomotive, called the LSSH, is powered by a Paxman type 6 RPHL, V-form engine, developing 275 b.h.p. at 1,360 r.p.m. The six cylinders of the engine, with a stroke of 7¼ in. and a bore of 7 in., are arranged in two banks of three inclined at an included angle of 60 deg.



THE RUSTON LSSH DIESEL-ELECTRIC SHUNTING LOCOMOTIVE AT WORK IN AN IRONSTONE QUARRY.

The torque converter is flange mounted on the flywheel housing of the engine and a cut-off clutch is incorporated between the engine flywheel and the converter. The clutch is operated by an external lever and actuated by an air cylinder. This stepless hydraulic transmission allows maximum utilization of power for haulage in spite of variations in load and gradient.

The locomotive frame is of all-welded steel construction and shunter's platforms are provided each side of the forward end of the machine. A walk-over, equipped with footsteps and safety hand-rails, is provided at the rear end of the locomotive. This enables the shunter to travel on the locomotive and change sides of operation without interfering with the driver.

Single-flange axle boxes with split thrust collars interposed between the boxes have been fitted so that when examination of axlebox bearings becomes necessary the boxes can be extracted inwards without dropping the complete running gear.

The spacious cab, affording visibility in all directions, is fitted with drop windows and hinged doors. Driver's controls are duplicated and grouped to two control positions, one at each side of the cab.

Air for the brake and other services is supplied by a single-stage compressor, belt driven from the main engine. An unloader delay feature prevents the compressor being loaded when starting the engine. Westinghouse driver's brake valve automatically controls the pressure of air to the two brake cylinders according to the amount of handle movement. A screw-down hand brake is also provided.

During the past year, a prototype LSSH locomotive has been undergoing proving tests, covering over 3,200 miles on a variety of applications which include long hauls with large loads at relatively slow speeds, short intermittent duties with congested sidings and sharp curves, and long runs at maximum speeds where severe down gradients tested the locomotive's braking capacity.

Orders are being completed for nine 5-ft. 6-in. gauge machines for Portugal. Early next year it is expected that the LSSH locomotive, which has also completed over 3,000 miles on field trials, will also be available with diesel-electric drive.

HEATING A SHIPYARD—by Gas

BELIEVED to be the largest gas radiant heating system in the world, 480 overhead heaters have been installed in the eight bays of the new ship prefabricating shops of Cammell Laird & Company, Limited, at Birkenhead. The eight bays cover an area of more than 11 acres, while the roof heights vary from around 60 to 80 ft. The lengths of the open-ended bays vary from 750 ft. (five) to 500 ft. (two) and 350 ft. (one).

The A.M.6 Parkinson Schwank gas radiant heaters, mounted overhead, which are in operation, provide immediate heat once they are switched on; they can, therefore, "clock on" with the men. Control equipment provides for switching on and off for morning and afternoon work periods for five days a week, a different period for Saturday, and an "off" for Sunday.

In addition, any selected part or parts of any of the bays can be kept heated for overtime periods for a predetermined period.

The heaters are mounted at a height of 23 ft. with an inclination of 60 deg. The heating scheme was planned to provide the ship prefabricating shops with an air temperature of 55 deg. F.

The cost of installing this overhead system was estimated to be between one third and one half of a boiler system capable of providing similar standards of heating.

"CLEARCALL"

Communication System for Mines

IN order to increase the speed and efficiency of locomotive working, and at the same time provide a greater measure of safety in mine railways, the electronic apparatus division of Associated Electrical Industries, Limited, Rugby, has devised a system of "Clearcall" carrier-frequency communication which provides an excellent two-way loudspeaking conversation channel for the locomotive driver and the despatcher.

Hitherto, the most general method of communication for mine locomotive drivers has been the normal mine telephone with, in some cases, reinforcement of the speech by amplifiers and loud-hailer units at selected points. A reinforcement system can be quite effective for beaming speech down a roadway, but it is likely to prove expensive for long roads since power must be provided for the amplifiers at each point. Also it is, in reality, a one-way communication system. These difficulties are overcome in a novel manner by the "Clearcall" system.

The new equipment is certified in accordance with mining Regulations as intrinsically safe and flameproof. Speech signals are transmitted by a modulated carrier-frequency in the 100 kc/s region along an aerial wire which is strung along the roof of the roadway. The locomotive carries a receiver with a loop aerial which picks up the signal from the wire in the same manner as a radio receiver, *i.e.*, without mechanical contact, and it is then amplified, demodulated, and passed to a loudspeaker in the cab. By similar means, a transmitting circuit enables the driver to acknowledge his despatcher's instructions and provide information as necessary to promote efficient working.

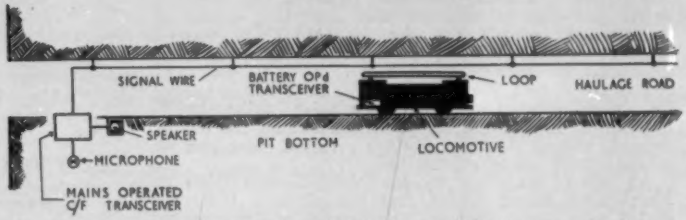


FIG. 1.—DIAGRAM SHOWING PRINCIPLE OF AEI "CLEARCALL" COMMUNICATION SYSTEM FOR MINES.

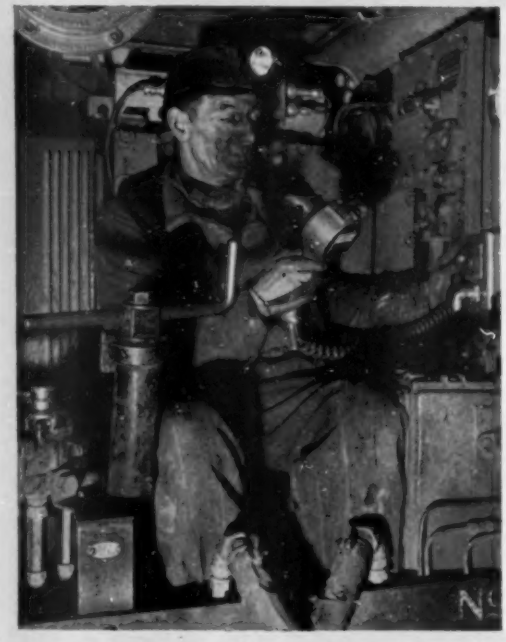


FIG. 2.—AEI "CLEARCALL" CARRIER-FREQUENCY COMMUNICATION SYSTEM IN USE ON A MINE LOCOMOTIVE.

The microphone and loudspeaker may be separate units, or a single loudspeaker-microphone unit can be employed.

For National Coal Board installations all the transceivers in the system are tuned to the same frequency, so that instructions and information are received simultaneously by all drivers. Equipments can be supplied, however, for operation on separate frequencies if desired, so that sectional working can be achieved.

This facility may well be preferred for oversea installations; in this connection a non-flameproof version is available.

The "Clearcall" equipment on the locomotive is operated by a transistor-inverter power pack driven from miners' cap-lamp batteries mounted in an intrinsically safe container. The static equipment is normally connected to the mine power supply at the selected operating point of the railway system.

Figs. 1 and 2 show the principle of the "Clearcall" carrier-frequency mine communication system and the equipment in service on a locomotive at Maltby Colliery in the No. 1 (Worksop) Area of the North-Eastern Division of the National Coal Board.

Seven locomotives at this colliery have been fitted with the equipment. The extent of its operation may be assessed from the fact that no less than 1,000,000 tons of coal was moved by these seven locomotives in 1959.

Yorkshire Pit Disputes Cost 12,000 Tons of Coal

WORK was resumed on Monday at Barnburgh Main and Aldwarke collieries (Yorks) after strikes which lost an estimated 12,000 tons of coal. Talks on the disputes at these pits and at Bentley and Maltby collieries have begun with NCB officials. The Aldwarke dispute originated when four rippers who left the pit because work was not available for them were instantly dismissed. They have now been reinstated.

At Barnburgh Main the stoppage began because it was claimed that an injured man had been refused a note to allow him to leave the pit. The colliery's deputies deny the allegations and Mr. Laurie Wormald, Yorkshire Area secretary of the National Association of Colliery Overmen, Deputies, and Shotfirers, said that it was felt that something should be done to protect the deputies. NACODS was prepared to meet the NCB and the NUM at any level to discuss the matter.

The claim that Bentley Colliery was undermanned by junior officials led to a one-day strike by deputies at the pit last week. A spokesman for the deputies alleged that the shortage involved some risk of neglect of safety precautions.

An official statement by the North-Eastern Divisional Coal Board denied that the pit was understaffed with junior officials. The number of overmen, deputies, and shotfirers employed at Bentley was 102, which was more than adequate for the pit's normal requirements. No official had averaged more than 5.3 shifts per week this year and only 10 men had averaged more than five shifts per week this year to date, the statement said.

It was reported on Monday that, following discussions between the Divisional Coal Board and NACODS leaders, six more deputies were to be appointed at Bentley.

Progress of "Rejuvenated" Lanarkshire Pit

REOPENED three years after its closure when fresh reserves of coal were discovered, Overtown Colliery (Lanarkshire) is now producing 400 tons a day and has a labour force of 451. A progress report on the colliery has been given by Mr. W. Welsh, general manager of the Central East Area, Scottish Divisional Coal Board.

"Output will shortly go up to 600 tons a day, and by the end of the year it should reach the full planned output of 750 tons," he states. "The number of men required when that is achieved will be in the region of 500." Mr. Welsh goes on to say that underground work outstanding includes the installation of man-riding facilities to the dip and the installation of the main dip coal haulage.

DUBILIER CONDENSER COMPANY (1925), LIMITED—Mr. F. J. Hurn has been appointed deputy chairman.

A.B.C. COUPLER & ENGINEERING COMPANY, LIMITED—Mr. W. V. S. Sinclair has resumed his position as chairman.

GRAHAM FIRTH STEEL PRODUCTS, LIMITED—The offer by Brightside Engineering Holdings, Limited, to acquire the company has been accepted by the holders of all of the shares which were subject to the offer.

Coal Stocks Position

DETAILS of coal stocks as at August 13, 1960, compared with those available at August 15, 1959, are given in the appended table issued by the Ministry of Power.

Figures in parentheses, mainly calculated on the basis of requirements during the winter, indicate the total weeks which the tonnage in stock would last.

Week ended:—	Aug. 13, 1960.	Aug. 15, 1959.
	Thous. tons.	Thous. tons.
Distributed stocks—		
Public-utility undertakings—		
Gas	2,013 (3.9)	2,469 (4.6)
Electricity	5,962 (5.1)	6,788 (6.0)
Railways	484 (2.6)	506 (2.4)
Coke ovens	1,213 (2.2)	1,110 (2.2)
Industrial consumers—		
Iron and steel	192 (2.2)	188 (2.2)
Engineering and other metal industries	259 (2.9)	317 (3.6)
Other industries	1,665 (3.2)	1,821 (3.5)
TOTAL INDUSTRIES	2,116	2,326
Merchants' stocks—		
(*a*) House coal	1,171	1,368
(*b*) Anthracite and boiler fuel	184	173
Miscellaneous (estimated)	290	377
TOTAL DISTRIBUTED STOCKS	13,433	15,117
Undistributed stocks—		
At collieries (on ground and in wagons)	27,901	24,009
At open-cast sites	6,524	6,661
TOTAL UNDISTRIBUTED STOCKS	34,425	30,670

Conveyor Belt Loading at Darfield Main Colliery

NEW loading system, designed largely to do away with the conventional tubs, is to be introduced in the Melton Field Seam of Darfield Main Colliery (Yorks). A conveyor belt will take all the coal mined to the pit bottom, where it will be loaded into tubs for winding to the surface. A little more than half of the pit's weekly production of 10,000 tons comes from the Melton Field Seam.

The work is being carried out during the annual holiday and the new loading system should be operating when the 1,400 miners return to work on Monday.

Sir HAROLD BOWDEN, president of Raleigh Industries, Limited, died on Wednesday at the age of 80. He succeeded his father, the founder of the concern, as chairman of Raleigh Cycles in 1921. He retired as managing director in 1938, but did not relinquish the chairmanship until 1954, when he assumed the newly created post of president. Sir Harold was twice president of the British Cycle Manufacturers' Association, and was a vice-president of the Federation of British Industries

Company News

HARDYPICK REJECTION

Laycock Offer Not "Fair and Reasonable"

DIRECTORS of Hardypick, Limited, mining tools and machinery manufacturers, of Sheffield, state that having regard to trading prospects and to professional valuation and advice, they consider it unreasonable that Laycock Engineering, Limited, Sheffield, should acquire net assets calculated at £539,751 for £272,500. They do not consider the offer fair and reasonable, do not intend to accept the offer for their own preference and ordinary shares, and do not recommend ordinary holders to accept. Laycock is offering 65s. for every £1 ordinary and 30s. for each £1 7 per cent. cumulative preference share.

Mr. T. G. Jameson, Hardypick chairman, states that the falling profit trend has been reversed and for the year ended June 30, 1960, the profit, before tax, of £30,011 compares with £13,939 previously. This has been achieved despite shortages in supplies of steel and delays in delivery of hickory timber.

Unless the offer becomes unconditional, the directors intend to pay a final dividend of 17½ per cent., making 25 per cent. for 1959-60. In view of the improving trend of trade the directors anticipate maintaining future dividends at no less rate. For each of the past six years holders have received 20 per cent.

ABERFORTH HOLDINGS, LIMITED—The accounting date is to be changed from June 30 to December 31, 1960. Second interim dividend is 7½ per cent. and in respect of the additional six months trading, a final dividend of 12½ per cent. is forecast.

OLDHAM & SON AFRICA, LIMITED—A one-for-two scrip issue is proposed, which will increase the issued share capital to 1,800,000 5s. shares. Group profit in the year ended March 31, 1960, rose from £91,000 to £121,000, after tax, and the dividend is raised from 9d. to 1s. a share.

B. ELLIOTT & COMPANY, LIMITED, machine tool makers, of Cardiff—Unchanged final dividend of 10 per cent. maintains 17½ per cent. for the year ended March 31, 1960. Group trading profit rose from £201,345 to £269,622, with a net profit, before tax, of £168,893 (£10,701).

RANGE BOILERS, LIMITED—Interim dividend is raised from the equivalent of 3¾ per cent. to 5 per cent. on a capital to be doubled by a scrip issue. The interim payment will be delayed until September 22 because of the issue. The equivalent total dividend for last year was 17½ per cent.

RIVET BOLT & NUT COMPANY, LIMITED—The offer by Acton Bolt, Limited, to acquire the company is now unconditional, acceptances having been received in respect of over 90 per cent. of the capital. Acceptances will continue to be received until further notice, but in any case until September 13.

EXPANDITE, LIMITED—Both turnover and profits in the current year are continuing to rise, states the chairman, Mr. B. Watson. An increasing range of products is being successfully marketed at home and the current order position is strong, while participation in world export markets increases each year. Three additional buildings are shortly to be taken into use to expand UK production.

SIEBE GORMAN & COMPANY, LIMITED, manufacturers of breathing and life saving equipment, etc., of Chessington (Surrey)—The offer by the Fairey Company, Limited, to acquire all the issued ordinary 5s. shares has been accepted in respect of over 93 per cent. of the shares. The offer is now unconditional.

HALL ENGINEERING COMPANY, LIMITED—The offer to purchase all the 1,600,000 shares of Perfecta Motor Equipments, Limited, has been accepted by the holders of more than 91 per cent. of the shares. The resolution increasing the company's authorized ordinary capital by £160,000 was passed at the extra-ordinary meeting last Friday.

HARTLEY ELECTROMOTIVES, LIMITED, electronic, electrical, and mechanical engineers, of London, S.W.7—The issued share capital has been acquired by James Austin & Sons (Holdings), Limited, for £218,300. Of this sum, £139,300 is to be paid immediately and the balance in three equal instalments on June 30, 1961, 1962, and 1963.

HACKBRIDGE HOLDINGS, LIMITED, makers of electric cables, transformers, etc., of Hackbridge (Surrey)—A one-for-one scrip issue is proposed. A final dividend of 12½ per cent. maintains the dividend on the £450,000 ordinary capital at 20 per cent. for the year ended March 31, 1960. Group profits fell from £321,202 to £276,777, before tax of £102,623 (£124,326).

INTERNATIONAL COMBUSTION (HOLDINGS), LIMITED—The interim dividend is maintained at 10 per cent. The chairman, Sir James Reid Young, stated in his last review that for the next two or three years a decline in the trading profits earned must be expected. It is forecast that it will be possible to pay the same 30 per cent. total dividend as for the previous year, but the profits will show a decrease.

SPARK HOLDINGS, LIMITED—Mr. J. G. Lawson, the chairman, states that it was only necessary to resort to a very minor extent to bankers to finance the cash portion of the consideration for the acquisition of Hawke Cable Glands, Limited, and J. T. Price & Company (Brass & Aluminium Founders), Limited. It is expected that the normal flow of profits will result, in a short time, in the group being in credit with its bankers, notwithstanding ordinary trading requirements.

B.H.D. ENGINEERS, LIMITED—Mr. F. B. Holmes, the chairman, warns that the current year's profits are expected to fall somewhat below those of the 12

months ended March 31, 1960. Business on hand is not sufficient to keep those companies producing heavy engineering plant engaged to full capacity. The problem caused by the much reduced work for the coal, gas, and steel companies continues and can only be met by new techniques and products, which policy the board is pursuing.

THORN & HODDLE, LIMITED, lighting, heating, welding engineers, etc., of London, S.W.1—With the gradual close-down of the business of the company, which is a subsidiary of the British Oxygen Company, Limited, another subsidiary, British Industrial Gases, Limited, is taking over the company's service to customers and the repair and maintenance of all its equipment. Partly because of the extra work and partly because of expansion in its normal business British Industrial Gases is to extend its works.

KANGO ELECTRIC HAMMERS, LIMITED—Since the beginning of the year production has been progressively increased and by the end of July was running at over 30 per cent. above the level at the end of the year 1959, state the directors. Sales in the first seven months of the year were approximately 15 per cent. above those of the last seven months of 1959. The interim dividend is raised from 6 per cent. to 7½ per cent. In 1959 the total dividend of 17½ per cent. included a 2½ per cent. golden jubilee bonus.

FIRTH BROWN TOOLS, LIMITED—The latter months of the year have seen a further expansion of sales, states Mr. Eric Mensforth, the chairman. This resulted in an improved consolidated profit, before tax, for the year of £467,463. Capital expenditure during the year was slightly less than in recent years at £125,348. It is planned to spend at a higher rate during the next three years to provide buildings and production facilities for further expansion. A machinability research department is nearing completion.

DOWTY GROUP, LIMITED—Forward prospects are good, states Sir George Dowty, the chairman. He is confident that further progress can be looked for. Additional products introduced have opened new markets, both at home and oversea, so that opportunities are even more widely spread than hitherto. In this connection mining equipment has been successfully exported to Poland and the US, where good potentials are foreseen. A licensing agreement has been entered into in Japan whereby pitprops are now being produced in that country. An "impressive export record" has been achieved in aircraft accessories, of which the group is now the largest manufacturer. Group net profit increased from £1,078,139 to £1,570,820 and the tax-free dividend is effectively increased by 2.2 per cent. to the equivalent of 9.1 per cent.

Spain Extends Steel Exports

SPANISH steel producer, Ensidesa, which entered the world export market last autumn, has announced its intention to bring Siemens billets into its export programme in addition to Thomas billets. Production of blooms is to begin at the company's Aviles plant in October and girders will be produced by the end of the year.

The company is not accepting new orders until late this year and its total production of pig-iron billets and ingots up to January, 1961, has been sold. It has just received a 30,000-metric ton order from Japan. The production of steel is to be expanded and a Linz-Donawitz steelworks has just been ordered at a cost of £2,250,000.

Welsh Miners Urge Strike Over Wage Claim

SOUTH WALES miners at a delegates' conference at Porthcawl on Monday issued calls for a strike in protest against the latest wage award of the National Reference Tribunal. The tribunal recently rejected a claim for 12s. a week, and awarded 5s. and a reduction of one hour a week in working time, against the miners' claim for two and a half hours.

The miners' Area president, Mr. Will Whitehead, said after the conference: "From all parts of the coalfield there were calls for 14 days' notices to be tendered to end agreements or, alternatively, that a time limit should be placed on the Coal Board in which it should be called upon to meet demands for better wages and shorter hours."

An Area executive resolution had been adopted, protesting against "the contemptuous terms of the award both in regard to wages and hours," and called upon the national executive to use every endeavour to secure a seven-hour day underground and eight-hour day on the surface, together with a substantial increase in wages.

Mr. Whitehead described the NCB offer of 5s. a week as a "packet of fags rise."

Miner Killed by Runaway Tub

OMISSION on the part of a journeyman at Maritime Colliery (Glam) resulted in the death of Mr. Stanley Williams, a conveyor attendant, a Pontypridd inquest jury was told. The journeyman, Mr. Edward Edwin Vaughan, said that he forgot to reshackle the first of a train of tubs after disconnecting them to right a derailed tub. He noticed that one was missing when he started the journey. He rushed down the line and saw that the tub had crashed into Mr. Williams, who died from the multiple injuries he received.

Questioned by Mr. Bryn John, representing the relatives and the National Union of Mineworkers, Mr. Vaughan said that a safety pointer which was supposed to derail runaway tubs was closed at the time of the accident. He did not know who shut it. The colliery undermanager, Mr. Merlin James Harris, said that he could not discover who closed the switch, but the accident would not have happened, he said, if it had been open. The jury returned a verdict of Accidental Death.

FIRST NATIONALIZED CHIMNEY SWEEP

FOLLOWING requests from people who said there was a shortage of chimney sweeps, the marketing department of the North-Western Divisional Coal Board has entered the chimney sweeping business as a new personal service to its customers. At present, the service is being confined to the Greater Manchester area, Stockport and district, the Oldham, Bury, and Bolton districts, and the Leigh, Atherton, and Swinton districts. Britain's first nationalized chimney sweep is 55-year-old Mr. Edward Hayes, of Long Causeway, Farnworth, who works in clean white overalls and carries his equipment in a shining white van with gold lettering.

The North-Western Division is one of the largest coal retailers in the world, supplying more than 300,000 customers with nearly 1,000,000 tons a year. It has nearly 100 order offices in Lancashire and Cheshire.

THE COAL TRADE

IN keeping with the weather the climate of the coal trade has changed completely in almost a matter of days. From reports of apathy, sluggishness, and lethargy so far as order-books were concerned, and almost complete disregard for the wisdom of stocking at summer prices, reports are now of a brisker trade in domestic qualities and even anxiety to stock up following statements that manpower shortages at the collieries and transport difficulties in the Midlands could lead to winter scarcity.

DERBYSHIRE

The recent improvement in demand for domestic coals is being maintained. Interest in best and hand-picked qualities is about normal, and there is a satisfactory flow of supplies. The better types of screened cobbles and brights are popular, and despatches are coming forward regularly. Cheaper brights command considerable attention, with the supply position being relatively tighter. Best large nuts are still comparatively quiet, and reduced tonnages are being accepted by most merchants owing to the difficulty of storing this type of coal. Demand for washed medium and small nuts shows a steady improvement and despatches continue to be in line with merchants' current needs.

Demand for domestic coke nuts continues to be on a moderate scale with good supplies readily obtainable from local works and premium smokeless fuels also are fairly quiet. Demand for domestic sizes of anthracite shows some improvement, and availability is not as good now as it was earlier in the summer, best qualities being particularly difficult to obtain. Small anthracite supplies are subject to some delay but most merchants are able to maintain deliveries. Demand and supply of "Phurnacite" are both good.

The improvement in demand from industrial consumers is maintained, and on the hole availability is not causing any concern. Deep-mined and open-cast slacks continue to be readily available. Dry screened nuts are subject to a firm call, and all available tonnages are being promptly taken up to meet current needs. A fairly steady demand for all washed fuels can at present be met without any difficulty. There is a steady inquiry for hard steam coals and despatches are fairly regular to enable current orders to be met satisfactorily. There is a slight improvement in the demand for hard and gas cokes, but prompt deliveries can usually be made in answer to all orders received.

STRIKE HOLDS UP COLLIERS

BECAUSE colliers were held up in port by the strike of seamen, 60,000 tons of coal might have to be stockpiled on the coastal areas of the Durham Division, the National Coal Board stated on Tuesday.

One London collier owner has sent a letter to strikers in Sunderland, where 21 ships with 70,000 tons of coal are delayed, pointing out the possible damage done by the strike to the collier trade at a "crucial stage" in its fight for survival.

ALUMINIUM centre guard rails and posts are to be erected on 35 miles of highway in New York City. The 2,000,000 lbs. of metal required will be supplied by Reynolds Metals Company and the order is considered to herald the entry of aluminium into a field dominated by steel and cement.

Coal Consumption Exceeds Output

CUTS made in coal production, coupled with an increased demand so far this year, show a far healthier relationship between production and consumption than in the same period of 1959, when output had exceeded the total consumption by some 12,000,000 tons. In the first 32 weeks of this year total consumption has exceeded the output of 118,677,000 tons by 1,164,000 tons.

This has not been brought about merely by producing less coal. So far this year sales have risen by nearly 3,500,000 tons. Of this increase over 1,000,000 tions is accounted for by increased exports, which have risen from 2,320,000 tons in 1959 to 3,379,000 tons so far this year.

On August 13, merchants had just under 2,000,000 tons less coal in stock than in the corresponding period of 1959. At 13,433,000 tons the figure for the week was some 150,000 tons less than the previous week—suggesting that householders are beginning to think of laying in winter supplies of coal.

There were 592,700 wage-earners on colliery books on August 13, against 653,300 on August 15, 1959, the numbers engaged at the coal face being 226,000 and 254,600 respectively. Total absenteeism (all workers) in the week ended August 13 was 14.65 per cent. compared with 14.49 per cent. in the week ended August 15, 1959. Output at the face was 3.787 tons and overall 1.305 in the week ended August 13, compared with 3.540 and 1.259 tons in the week ended August 15.

The following table gives (in tons) the output of saleable mined coal by division in the week ended August 20, and the tonnage lost through all causes (holidays, disputes, and go-slows):—

Division.	Week ended August 20, 1960.		Week ended August 22, 1959.
	Total output.	Tonnage lost.	Total output.
Scottish	344,900	3,500	364,500
Northern (N & C) ..	232,800	3,000	242,900
Durham	326,500	125,100	339,300
North-Eastern ..	712,500	90,900	721,600
North-Western ..	250,700	8,700	278,000
East Midlands ..	769,700	104,600	787,800
West Midlands ..	259,400	200	285,800
South-Western ..	362,100	7,600	397,300
South-Eastern ..	27,500	700	31,100
Great Britain—			
Deep-mined coal ..	3,286,100	344,300	3,448,300
Other deep-mined (including licensed mines) ..	38,300	—	48,100
Open-cast coal ..	149,100	—	200,800
TOTAL	3,473,500	344,300	3,697,200

Personal

Presentation was made recently to Mr. H. E. HALL on his retirement as manager of the excavator spares department of Newton Chambers & Company, Limited, Sheffield.

Mr. R. A. COOKSON, managing director of Associated Lead Manufacturers, Limited, Newcastle-upon-Tyne, has been elected chairman of the council of Northern Chambers of Commerce.

Mr. HAROLD SPENCER, head tutor in the engineering department of Grantham College for the past 15 months, has left for Ghana, where he is to start technical teacher training at Kumasi, specializing in engineering.

Starting on September 5, Mr. ED. PECKHAM, chairman and managing director of Metalock (Britain), Limited, London, W.C.2, and Mr. "SANDY" PAGET, a director of the company, are to make a three-month tour in the north of England.

By agreement, Mr. JAMES MACMILLAN is to retire from the board of Cory Bros. & Company, Limited, coal shippers, etc., of Cardiff, on September 30, 1960. He will, however, continue to represent the company in certain spheres of its oversea activities.

The Minister of Power has appointed Mr. P. T. MENZIES as a part-time member of the Central Electricity Generating Board in succession to Mr. G. A. S. Nairn, who has retired. Mr. Menzies is financial director of Imperial Chemical Industries, Limited, and a director of Yorkshire Imperial Metals, Limited.

Managing director of Mitchell Engineering, Limited, Peterborough, Mr. J. F. ROY MITCHELL, has left for Italy to take part in the Olympic Games. He has been selected by the Royal Yachting Association to represent Great Britain in the International Star Class, and will sail his yacht, Twinkle, with his wife as crew.

Mr. GEORGE LEE is retiring from his position as joint deputy chairman of Thomas Holt, Limited, textile engineers, of Rochdale (Lancs), at the end of the year. He was joint managing director of the company for 12 years, with special responsibility for the Darwen factory. He will continue to act in a consultative capacity after his retirement.

An instructor at the Muiredge Mining Training Centre, Buckhaven (Fife), for seven years, MR. GEORGE SINCLAIR, is retiring after 51 years in the coal-mining industry. He was presented with a long-service certificate by Mr. T. D. M. Scrimgeour, Area general manager. Mr. Sinclair, who served in a number of pits and was a deputy for 20 years, holds a gold medal for 20 years' service in rescue work. The centre at Muiredge is closing down, and recruits will now attend residential training at Sauchie, near Alloa.

Non-ferrous Metal Prices

(Delivered, unless otherwise stated)

Copper—Solid-drawn tubes, 2s. 4¾d. per lb.; rods, 261s. 6d. per cwt. basis; 20 s.w.g., 296s. 6d. per cwt.

Brass—Solid-drawn tubes, 1s. 11½d.; sheets up to 10 w.g., 213s. 3d. per cwt.; wire, 2s. 9⅝d.; rolled metal, 213s. 3d. per cwt.

Lead Sheets, etc.—Sheets, £109; pipes, £111 5s. per ton.

Zinc Sheets, etc.—Sheets, 15 g. and thicker, ex works, English destinations, £122 12s. 6d.; rolled zinc (boiler plates), ex works, all English destinations, £120 7s. 6d.; zinc oxide (Red Seal), d/d buyers' premises, £102 per ton.

Other Metals—Nickel, £600. Aluminium ingots, £186. Antimony, English, 99 per cent., £190. Quicksilver, ex warehouse, £69 15s. to £70. Bismuth (per lb.), 16s. nom. (1-ton lots). Cadmium, 10s. 6d. per lb. Magnesium ingots (per lb.), 2s. 2½d. to 2s. 3d., notched bars 2s. 9¼d. powder 6s. 1d. Platinum, per oz. (troy), £30 5s.

Steady Rise in German Steel Production

ESTIMATES issued in Dusseldorf last week put the 1960 production of raw steel in Federal Germany, including the Saar, between 33,000,000 and 34,000,000 metric tons. Special steel production should reach a total of between 2,500,000 and 2,600,000 tons and the turnover of the national special steel industry is estimated at about DM 2,500,000,000 (about £210,000,000).

During the first half of the current year orders for rolled steel averaged 1,710,000 tons a month, compared with an average of 1,670,000 tons a month in the first six months of 1959. Of this monthly average, 1,360,000 (1,250,000) tons were inland orders and orders from other ECSC countries totalled 151,000 (133,000) tons, while orders from outside the ECSC fell to 195,000 (283,000) tons. Rolled steel deliveries over the first six months of the year averaged 1,630,000 (1,430,000) tons a month. Of this, 1,280,000 (1,070,000) tons comprised inland deliveries, 140,000 (117,000) tons went to ECSC countries, and 212,000 (240,000) tons went to non-Community countries.

Orders on hand with West German producers at the end of the half year amounted to 5,970,000 tons, against 6,030,000 tons at the end of last year. Outstanding orders from inland customers were higher, but all foreign orders on hand were lower than at the end of 1959.

Iron-ore Imports

IMPORTS of iron ore and concentrates (except chrome iron ore) and roasted iron pyrites in July, and the totals for the first seven months of this year and last, are shown in the table below.

From	Month ended July 31.	Seven months ended July 31.	
	1960.	1959.	1960.
	Tons.	Tons.	Tons.
Sierra Leone	57,530	387,746	474,131
Canada	505,266	985,229	1,397,124
Other Commonwealth countries and Eire	3,000	9,600	19,607
Sweden	404,945	1,703,943	2,729,526
Norway	35,470	155,998	206,251
France	37,872	270,590	337,917
Portugal	15,770	126,234	209,604
Spain	46,378	298,261	454,955
Algeria	145,658	848,217	1,210,794
French West Africa	—	133,341	—
Tunisia	40,705	308,403	481,104
Morocco (excluding Tangier)	60,375	230,328	498,495
Liberia	73,740	213,573	323,554
Venezuela	140,734	680,448	969,323
Brazil	53,010	315,128	396,054
Other foreign countries	39,849	99,698	401,894
Total	1,660,302	6,766,737	10,110,333

RECORD rate of construction for Austin & Pickersgill, Limited, shipbuilders, of Southwick, is claimed for the 18,105-ton ore carrier Longstone, which will be ready for sea 105 days after her keel was laid. At the launch on Wednesday, the managing director, Mr. Kenneth Douglas, said that the construction must rate as one of the fastest recorded in the British shipbuilding industry.

GEC Auto-transformers for CEGB

ORDER from the Central Electricity Generating Board for two 180-MVA 275/132 kV. auto-transformers has been received by, the engineering group of the General Electric Company, Limited. The transformers will be of conventional design with on-load tap changing on the 132 kV. winding covering a voltage range of ± 15 per cent. in 18 steps.

The transformers are to be installed in a new sub-station at Bustleholm in the Midlands Division of the CEGB and will reinforce the supply to Birmingham and the Black Country. They will be fed from the nearby Drakelow "A" and "B" stations, which have an installed capacity at present of 480 mW.

When both the "B" and "C" stations are completed the combined installed capacity of the three stations will rise to 2,170 mW. The GEC order is valued at £280,000.

Sheffield Twist Drill Enters Tap and Die Field

VENTURE into the tap and die business has been made by the Sheffield Twist Drill & Steel Company, Limited, with the acquisition of the capital of Johnson Bros. (Taps & Dies), Limited, and Johnson Bros. (Ground Threads), Limited, both of Chilwell (Notts).

The acquisition of the Johnson Bros. companies has been paid for in cash, but information is limited to the statement that they are comparatively small but growing family businesses.

The reverse move was made last year when the Tap & Die Corporation, Limited, acquired control of the International Twist Drill Company, Limited. Sheffield Twist Drill bid for ITD, but the offer failed to obtain sufficient acceptance.

Ferro-alloy Prices

(Per ton, unless otherwise stated, delivered)

FERRO-SILICON (6-ton lots and over)—45 per cent. Si, £42 10s. to £44 10s. scale 15s. per unit, lumpy; 75 per cent. Si, £57 15s. to £61 10s., scale 15s. per unit, lumpy.

FERRO-VANADIUM—50/60 per cent., 20s. 6d. per lb. of V.

FERRO MOLYBDENUM 65/70 per cent., carbon-free, 12s. 10d. per lb. of Mo.

CALCIUM MOLYBDATE—12s. 4d. per lb. of Mo.

MOLYBDIC OXIDE BRIQUETTES—11s. 10d. per lb. of Mo, delivered United Kingdom.

FERRO-BORON—23/25 per cent., 7s. 6d. per lb.

FERRO-TITANIUM—20/25 per cent., 2-3 per cent. Cu, £250; 38/40 per cent., commercially carbon-free, £287.

FERRO-TUNGSTEN—80/85 per cent., 12s. 1d. per lb. of W.

TUNGSTEN METAL POWDER—98/99 per cent., 15s. 1d. per lb. of W.

FERRO-CHROME (6-ton lots and over, lumpy)—4/6 per cent. C, £20 10s. to £84 10s., basis 60 per cent. Cr scale 27s. to 28s. 6d. per unit; over 6 per cent. C, £79 to £82 10s., basis 60 per cent. Cr, scale 27s. to 28s. 6d. per unit; max. 2 per cent. C*, to 1s. 8d. to 1s. 11d. per lb. Cr; max., 1 per cent. C*, 1s. 8½d. to 1s. 11½d. per lb. Cr.; max. 015 per cent. C*, 1s. 9½d. to 2s. 0½d. per lb. Cr; max. 0.10 per cent. C*, 1s. 9¾d. to 2s. 0¾d. per lb. Cr; max. 0.06 per cent. C*, 1s. 10¾d. to 2s. 1d. per lb. Cr.

METALLIC CHROMIUM 98/99 per cent., 6s. 10d. per lb.

METALLIC MANGANESE—94/96 per cent., carbon-free, £275; 96/98 per cent., £285.

FERRO-COLUMBIUM—65/67 per cent., Cb+Ta, 19s. 6d. per lb. Cb+Ta.

FERRO-MANGANESE (home)—78 per cent., £61 10s.

**Average 68-70 per cent. Cr.*

Board Changes

New Director for Fafnir Bearing

MR. G. H. MARCHANT

GENERAL manager of FAFNIR BEARING COMPANY, LIMITED, Wolverhampton, Mr. G. H. Marchant, has been elected to the board of the company. His title will now be director and general manager.

Mr. Marchant, a former works manager of Fischer Bearings Company, Limited, Wolverhampton, joined Fafnir Bearing as general manager in January, 1960. Prior to this he had been works director of Sentinel (Shrewsbury), Limited, locomotive, machine-tool and diesel engine makers, of Shrewsbury, and general works manager of Joseph Sankey & Sons, Limited.

ROYSTON INDUSTRIES, LIMITED—Lt.-Comdr. J. M. A. Parker (retd.) has joined the board.

UNION STEEL CORPORATION (OF SOUTH AFRICA), LIMITED—Mr. D. O. Beckingham has been appointed a director in place of the late Mr. W. D. Wheeler.

W. P. BUTTERFIELD, LIMITED—Mr. A. J. Butterfield, deputy chairman, has been made chairman in succession to Mr. J. C. Butterfield, who becomes life president.

MATTHEW HALL & COMPANY, LIMITED—Mr. Edwin Baden, joint managing director, has been appointed chairman in succession to the late Mr. Bertram Baden.

WILLIAM DOUGLAS & SONS, LIMITED—Mr. A. I. Baker has been appointed chairman in succession to Mr. W. S. Douglas, who retains his seat on the board.

VENNER, LIMITED—Mr. Rupert Speir has joined the board in succession to Mr. G. H. Gunson, who has retired in order to devote more time to his other interests.

METAL CLOSURES, LIMITED—Miss J. R. Sherriffs has resigned from the board and from those of the subsidiaries, Plastic Closures, Limited, and Johnson Bros. (Closures), Limited.

MIDGLEY & SUTCLIFFE, LIMITED—Mr. J. Alcock, works manager since 1956, has been appointed to the board of the company, which is a member of the George Cohen 600 Group, Limited.

HARTLEY BAIRD, LIMITED—Mr. J. L. Symonds has resigned from the board following the disposal of its holding in Hartley Electromotives, Limited, to James Austin & Sons (Holdings), Limited.

NORTH BRITISH LOCOMOTIVE COMPANY, LIMITED—Mr. Alexander McKellar, president of the Chartered Accountants of Scotland, has been elected to the board in place of the late Mr. Hugh Cowan-Douglas.

TUBE INVESTMENTS, LIMITED—Mr. C. H. T. Williams and Mr. E. G. Plucknett have been appointed to the board. Mr. Williams is chairman of the Park Gate Iron & Steel Company, Limited, and Round Oak Steel Works, Limited, while Mr. Plucknett is managing director of the Simplex Electric Company, Limited.

Recent Wills

PATCHETT, T. R., retired colliery official, of Mansfield Woodhouse (Notts) £5,296

RAMSELL, H. G., general manager of Yale & Towne Manufacturing Company, and an authority on locks £25,935

ANTHONEY, N. C., former chairman and director of colliery companies, of Gosforth (Northumberland) £47,075

GALL, C. W., formerly managing director of William Firth & Company, Limited, steel merchants, of Leeds £4,819

HARKER, G. W., late deputy senior regional sales officer of the North-Western Divisional Coal Board £12,102

BELSEY, W. J., formerly manager of the marine department of the British Thomson-Houston Company, Limited £9,116

DOWNS, JAMES, former North of England area manager of Brown, Bayley Steels, Limited, Sheffield £1,703

HEYWOOD, S. W., of S. H. Heywood & Company, Limited, crane manufacturers, etc., of Reddish, Stockport (Ches) £61,315

SILYSTONE, G. R., chief accountant of No. 4 Area, East Midlands Divisional Coal Board, until his retirement in 1950 ... ... £1,029

JARMAN, J. H. W., former chief engineer (sales) of Tufnol, Limited, makers of electrical insulating materials, of Birmingham £8,705

STAVES, JOSEPH, former local director of Thos. W. Ward, Limited, engineers, ironfounders, metal merchants, etc., of Sheffield £6,762

WEBB, H. B., former chairman of Joseph Webb & Sons, Limited, makers of forgings for the engineering trade, of Bury (Lancs) £49,527

BROOK, J. L., vice-chairman of Brook Motors, Limited, electric motor manufacturers, of Huddersfield, and Mayor of Huddersfield £136,601

CORDINGLEY, HERBERT, founder and managing director of the Roto Engineering Company (Bradford), Limited, who died in November, 1954 ... ... £1,588

SPITAL, F. E., formerly chairman and managing director of J. W. Singer & Sons, Limited, manufacturers of brass pressings, of Frome (Somerset) £13,952

LOVATT, SAMUEL, former director of Smith & Nephew Associated Companies, Limited, Smith & Nephew Engineering, Limited, and other companies ... £306,112

CRANE, W. F., chairman and managing director of Cranes (Dereham), Limited, makers of trailers, wheels, axles, etc., of Dereham (Norfolk) ... £65,134

DIXON, WILLIAM, a senior partner in Merz & McLellan, Newcastle-upon-Tyne consulting engineers, and a member of the firm since 1911 ... £246,854

SHENTON, C. J., chairman of James W. Shenton, Limited, ironfounders and general engineers, etc., of Tipton (Staffs) and son of the founder of the firm £43,099

ARNOTT, J. M., a director of the Albany Sheet Metal & Engineering Company (Oldham), Limited, and of the Stoneleigh Manufacturing Company (Oldham), Limited £76,003

PRESTON, ARTHUR, a director and former seretary of W. H. Davis & Sons (Wagons), Limited, makers of railway rolling stock, of Langwith Junction, Mansfield (Notts) £13,839

EVANS, J. O., former chairman and managing director of Joseph Evans & Sons (Wolverhampton), Limited, pumpmakers, etc., and great grandson of the founder of the firm £528,415

NEWTON, HARRY, partner, director, and until his retirement two years ago, chairman of Israel Newton & Sons, Limited, engineers and boiler makers, of Bradford £13,140

SMITH, H. G., chairman of George Hattersley Sons, Limited, manufacturers of textile and weaving machinery, of Keighley (Yorks), and a director of the company for nearly 50 years. £78,821

MATTHEWS, DAVID, founder of the firm of David Matthews, Limited, iron, steel, metal, and tinplate merchants, of Swansea, twice Mayor of Swansea, and, for a short period, M.P. for Swansea East £28,222

TURNER, S. B., managing director of Pickford, Holland & Company, Limited, makers of refractories, of Sheffield, and a leading member of a number of associations in the field of refractories and ceramics £13,627

TINLEY, F. L., technical director for many years of Joshua Bigwood & Son, Limited, Wolverhampton engineers, a director of Butro Jig & Engineering Company, Limited, and other companies, and a member of the council of the Combustion Engineering Association £22,694

BAINBRIDGE, E. M., a former director of the Newbiggin Colliery Company, Limited, the Nunnery Coke & Gas Company, Limited, the Nunnery Colliery Company, Limited, and other companies £59,139

WOLSTENHOLME, JOHN, president of the Walmsley (Bury) Group, Limited, manufacturers of pulp and paper making machinery, director of all the companies in the group and a former chairman of of the company £370,680

SMITH, S. C., formerly managing director of S. Calton Smith, Limited, Dunstable, now a subsidiary of C. E. Johansson, Limited, precision engineers, and a former director of the Adamant Engineering Company, Luton £21,180

RIDSDALE, H. H., former mining engineer and director of the Tamworth Colliery Company, Limited, before nationalization, and a member of the South Staffordshire branch of the National Association of Colliery Managers £68,977

Plea to Minister Over Jarrow Factory Plan

FOLLOWING the decision by the Pressed Steel Company, Limited, to drop plans for the building of a £3,000,000 tool plant at Jarrow, leading representatives of Tyneside local authorities on Monday saw Sir Richard Powell, Permanent Secretary at the Board of Trade, in the hope that the company could be persuaded to change its mind.

A statement after the meeting expressed the deputation's "great concern" at the decision of Pressed Steel not to proceed with the factory. "The matter is one of great gravity, not only for Jarrow but for the whole of the north-east coast area," said the statement. The deputation asked the Board of Trade to use its good offices to see whether further consideration could be given to the matter.

On Tuesday the mayors of Jarrow and South Shields led the deputation in talks on the situation with the President of the Board of Trade, Mr. Reginald Mauldling. A joint statement issued afterwards said the deputation had repeated to the President its great concern at the decision of the Pressed Steel Company not to proceed with the factory project. "After a discussion, the mayors felt that the situation could not be accepted as final, and decided to pursue the matter on their return."

At the end of April the company announced that it was prepared to spend £3,000,000 on the factory, which would make dies for motor-car bodies, and since then it has been negotiating with the Amalgamated Engineering Union about terms of employment. The Tyneside officials of the union had objected to the company's requirement that certain processes should be timed with a stopwatch to provide a basis for setting piecework rates of pay.

It appears that the decision not to build at Jarrow was made after an unsuccessful meeting in London last week between company representatives, officials of the Board of Trade, and national officials of the union. The Tyne district committee of the union considered a report of that meeting on Wednesday last week, and the next day issued a statement agreeing to consider accepting stopwatch timing, provided the company paid the workers at Jarrow the same amount paid to workers at the parent factory for the same job. This offer came too late, however. The company had already informed the Board of Trade that it did not intend to build at Jarrow.

The area is still a black spot for employment, with 30,500 waiting for jobs—2.3 per cent. of the working population, against a national average of 1.3 per cent. Sunderland Town Council hopes to induce Pressed Steel to erect its factory on Wearside if the Jarrow scheme does not mature. Sunderland has 4,472 unemployed.

NEWS IN BRIEF

ADDRESS of Union Carbide, Limited, is now 8, Grafton Street, London, W.1. The telephone number remains the same—MAYfair 8100.

FIRST Siemens-Martin furnace is now being built at the Huneadora steelworks in Rumania. The unit will have an annual capacity of 350,000 metric tons.

IRON-ORE shipments from the Dominican Republic port of Haina continued this month when the Methan took 15,500 tons of ore bound for Essen, Germany, via Rotterdam.

MINING EQUIPMENT will be exhibited by Anderson Boyes & Company, Limited, Motherwell, at the second international trade fair to be held at Brno, Czechoslovakia, in September.

SHEFFIELD SAW MAKERS, Drabble & Sanderson, Limited, have been appointed sole agents in the UK for the sale of carbide tipped circular saws made by the American Saw & Tool Company, Louisville, USA.

SECRETARY of the National Union of Mineworkers, Mr. Will Paynter, has been elected to the General Council of the Trades Union Congress. This is the first time since 1949 that a Communist has sat on the council.

LARGEST CARGO of iron ore ever to arrive at Newport (Mon) docks was delivered by the Rio Orinoco from Venezuela last week. The cargo of 27,174 tons is destined for the Ebbw Vale works of Richard Thomas & Baldwins, Limited.

OLDEST and longest-serving employee of the Johnson Iron & Steel Company, Limited, West Bromwich, Mr. Thomas Shipley, retired on Saturday. He is 74 and he joined the company at 13, working as a straightener for 7s. 6d. a week.

CHARLES CHURCHILL & COMPANY, LIMITED, is moving its Manchester branch office and warehouse from St. Simon Street, Salford 3, to 2-12, The Crescent, Salford 5 (telephone: Pendleton 1382). The new premises will open for business on September 12.

NEW COMPANY, Dens Metals (Dundee), Limited, has been formed by Malcolm Ogilvie & Company, Limited, jute manufacturers, of Dundee. The firm will produce special metal alloys in continuous cast form for use primarily in bushes and bearings.

NEW HEADQUARTERS of the British Shipbuilding Research Association is the 10-floor Prince Consort House, 27-29, Albert Embankment, London. Initially, the association will use only six floors of the building, which it hopes to move into at the end of the year.

MEMBERSHIP of the "25 Association" of Hadfields, Limited, steelmakers, etc., of Sheffield, which is open to employees who have completed 25 years' service with the company, rose to 1,494 on Thursday of last week when Lord Dudley Gordon, the chairman, made presentations to 45 new members.

ANOTHER of the one-day-a-week token strikes by the 118 welders at the Glasgow shipyard of Barclay Curle & Company, Limited, was staged on Monday. The men are asking for parity with colleagues at an associated shipyard at Wallsend-on-Tyne who are paid more money. The Boilermakers' Society supports the claim.

AUSTRALIA'S export quota of scrap iron and steel is to be cut by 50 per cent. on January 1, 1960, and all exports under the quota system will almost certainly cease later in the year. Mr. John McEwan, Trade Minister, said that the cut was being made to meet the sharp increase in the demand for scrap from Australian steel mills.

BOSTON (Lincs) firm of Craven & Nicholas (Engineering), Limited, which has developed a mechanical pea-sorter for the canning industry, is developing an overseas market as well as supplying the UK food industry, and has just supplied a second machine to a New Zealand firm. The machine has a sorting capacity of about 1 ton.

ONE-DAY STRIKE was staged by workers at the Doncaster factory of International Harvester Company of Great Britain, Limited, on Wednesday because the men claimed that the company was refusing to negotiate on a wage claim. Some 1,500 men had walked out on Tuesday in sympathy with another pay dispute involving 20 men.

BRITISH TEAM of 32 apprentices leaves on September 24 to compete in the ninth international apprentice competition in Barcelona. The competition will be held from September 26 to October 1 and the teams will then spend four days on cultural and sight-seeing tours on the Costa Brava and in Tarragona before the presentation of prizes in Madrid.

PAPERS of the British Institute of Management's one-day conference on the Government Pension Scheme were published on Monday. A short introduction has been specially written by the conference chairman, Mr. G. R. Moxon, chairman of the BIM Human Relations Advisory Committee. The papers are available for 7s. 6d. (6s. to delegates of the conference and BIM members).

BOILERMAKERS' SOCIETY has lifted restrictions on overtime and working hours imposed some weeks ago at the Renfrew works of Babcock & Wilcox, Limited, when 40 union members were declared redundant. The men have agreed to normal working because a substantial number of those displaced have found other jobs. A ban on overtime at the company's Dalmuir works has also been lifted.

ABOUT 3,000 employees of the Caterpillar Tractor Company at Peoria, Illinois, are being laid off today (Friday) because first-half 1960 sales, while good, have not been as high as expected. Mr. H. S. Eberhard, president, said first-half sales of $385,000,000 were the second best for any period, but because the company had expected even higher volume this year, it was geared for business that did not materialize.

THE BEGINNING OF THE END of the "shale lorries," which during the past nine months have caused chaos on the roads of Monmouthshire as they hauled filling materials to the site of the new Spencer Steelworks at Llanwern, is now in sight. Sir Robert McAlpine & Sons, main contractors at the works, has announced that from the night of September 2-3 the night haulage of filling materials will come to an end. So far, somewhere in the region of 5,000,000 tons of filling material has now been transported to the site to raise great tracts of the low-lying pasture land by as much as 3 ft. to 4 ft. At the peak of the shale operation the lorries were making as many as 5,000 journeys a day to Llanwern. Although the traffic is now likely to decrease, it will be some considerable time before the shale lorries disappear altogether.

Coalfield News

Miners Talked to Guide Rescuers

BURIED in a roof fall at the West Seam of Markham Main Colliery (Yorks) two miners talked their way to safety—the sound of their voices guiding rescuers. Mr. George Nelthorpe (31) and Mr. George Barnard (37) were working on their own when the roof caved in. Their shouts brought other miners in the seam to the spot and they began pulling away the rock with their hands.

The trapped men were able to talk and water was passed to them through a crack in the fall. After five hours hard digging by rescue workers they were freed and taken to hospital, where it was found that apart from minor cuts and scratches they were unhurt.

SLAG HEAP, which has been an eyesore at Denby (Derbyshire), for 100 years, has been turned into a school playing field.

MORE THAN 1,750 miners were sent home after an explosion in the winding-engine room at Cardowan Colliery, Stepps, near Glasgow, last week. No one was injured.

A FORMER NEWPORT MAN now living in New Zealand and a group of his friends are among the latest contributors to the Six Bells Colliery Disaster Fund, which now totals over £72,200.

LAST BUT ONE of the coal hoists at Burntisland (Fife) Docks is to be demolished. Coal shipments from the port have fallen to nil from the pre-war figures of over 1,000,000 tons a year.

NORMAL WORK was resumed on Monday at Great Mountain Colliery, Tumble (Carmarthenshire), where 750 miners struck last week over the transfer of men to the new anthracite pit at nearby Cynheidre. Negotiations are going on.

REDUNDANCY NOTICES were served on Monday to most of the 200 employees of Argyll Colliery, which was flooded in an attempt to drown a fire which broke out in the workings last week. The fire was lessening considerably, it was stated, and it was hoped to re-engage a large number of the men soon on development and salvage work.

INQUEST JURY at Chesterfield asked for more precautions to be taken in earth-shifting operations when it returned a verdict of Accidental Death on Mr. James Pollock (27), who was killed when his 22-ton earth mover fell over a 100-ft. cliff into 20 ft. of water at an open-cast coal site. The coroner said there was no question of negligence.

FIRST TOWN IN BRITAIN to be supplied entirely with natural gas will be Whitby (Yorks). The supply will come from two natural gas pockets 4,000 ft. below ground at Aislaby and Grosmont, in the Esk Valley, and it is expected to fulfil the town's needs for the next 25 to 30 years. The official opening of the supply on September 23 is to be attended by the Minister of Power, Mr. Richard Wood.

EVERY PERSON who has lived in Walsall for a number of years has coal dust in their lungs, an inquest in the town was told by Dr. David Hewspear, a pathologist. He was giving evidence at the inquest on a former coal cutter, Mr. James Matthew Tennant (54). Although Mr. Tennant has been drawing a pension from the Pneumoconiosis Board since 1944, a post-mortem examination showed that he had not suffered from the disease and had died from heart failure after chronic bronchitis. A verdict of death from natural causes was recorded.

MINERS at Lea Hall Colliery (Staffs), which opened only last month, are dissatisfied with underground facilities at the pit and have decided to seek union advice about their complaints. A branch official of the NUM said: "We realize that many faults will be overcome in due course, but some of the men feel that things should be speeded up and we may ask the union to take the matter up with the National Coal Board." The men were also annoyed, he said, that overtime had been banned. An NCB official said that the board had received no complaints and that overtime had ended because the work needed to bring the colliery into production had been completed.

NCB Films at British Association Meetings

MODERN mining methods will feature in a programme of films made by the National Coal Board which are to be shown at the meeting of the British Association for the Advancement of Science in Cardiff from August 31 to September 7. The films will be shown at the Reardon-Smith Lecture Theatre—the National Museum of Wales.

"The Mawco Cutter Loader" is being shown on September 1 (2.30 p.m.) and on September 6 (5 p.m.). "Britain's Wealth From Coal" can be seen on September 2 (1.30 p.m.) and on September 5 (5.58 p.m.), while "Bubble Behaviour in Froth Flotation," a film on research into coal-preparation methods, made at the board's Coal Research Establishment at Stoke Orchard, near Cheltenham, is being shown in the morning of September 3.

"Britain's Wealth From Coal," which is about the formation of the coalfields, planning and sinking a new mine, winning the coal and making it available for its many uses, will also be shown throughout the week beginning October 24 in a programme of films to be presented to secondary modern school children in Coventry. The programme has been arranged by the West Midlands Area Committee of the British Association. The film runs for 22 minutes and is a condensed and simplified version of the board's film series "Coal Mining as a Craft."

"Good Luck" Message to NCB Competitors in Olympics

"THE whole coal-mining industry is proud of you. The best of luck from us all." That message was sent on Wednesday by Sir James Bowman, chairman of the National Coal Board, to three NCB employees who will represent Great Britain at the Olympic Games, which started yesterday (Thursday). They all come from the Yorkshire coalfield.

Miss Dorothy Hyman, who will represent Great Britain in the women's 100 metres event, is a well-known sprinter. She works as a tracer at No. 6 Area (North Barnsley) headquarters offices, Barnsley. Mr. Arthur Rowe, Great Britain's representative in the shot put event, is blacksmith's striker at North Gawber Colliery, near Barnsley. Mr. B. Hoban, an apprentice electrician at Newmarket Colliery, near Castleford, is in the cycling team.

Orders Placed

Buell Drying Plant for Lancashire Steel

CONTRACT from the Lancashire Steel Manufacturing Company, Limited, for the supply and erection of Buell drying plant complete with high efficiency dust collectors and ancillary equipment, worth about £200,000, has been gained by Buell, Limited, a subsidiary of Edgar Allen & Company, Limited. The plant will handle 225 tons per hour of wet Northants ore to be dried to a final moisture content not exceeding 12 per cent.

Buell has also obtained orders from other steel companies for a Buell high efficiency dust collection system for the discharge end of a sinter machine, and also extensions to an existing dust collecting plant just commissioned, worth together about £30,000. A further order worth £100,000 is for three vertical turbo dryers, each with an output of 9½ tons per hour of china clay, for installation at three sites in Cornwall.

THREE nitrogen and hydrogen plants are to be supplied by the Incandescent Heat Company, Limited, Birmingham, to a Belgian steelworks. The contract is worth £55,000.

NEW TYPE of level-luffing jib crane has been ordered from Babcock & Wilcox, Limited, London, N.W.1, by the Fairfield Shipbuilding & Engineering Company, Limited, Glasgow. It will have a lifting capacity of 80 tons at a 90-ft. radius.

CONTRACT WORTH £7,000 for the supply of two complete, automatic, base-exchange plants for two sugar beet factories to be built in Russia by Vickers & Bookers, Limited, has been awarded to William Boby & Company, Limited, water treatment engineers, of Rickmansworth (Herts).

VALUE OF two contracts awarded to William Boby & Company, Limited, Rickmansworth (Herts), by the National Coal Board, is approximately £13,000. The contracts are for fully automatic type de-alkalization/base exchange plants, one for Sutton Manor Colliery and the other for the Altham coke ovens.

HEAD WRIGHTSON PROCESSES, LIMITED, a subsidiary of Head Wrightson & Company, Limited, has been awarded a contract for the supply of three induced-draught cooling towers for the new Spencer Works of Richard Thomas & Baldwins, Limited. These towers, which have a total capacity of over 1,800,000 gal. of water per hour, will be used for supplying cooling water to the hot and cold strip mills for the finishing section of the plant.

Big Ben's Veteran Wire Rope

WIRE rope 101 years old which had been used to work Big Ben was found by an engineer of British Ropes, Limited, Doncaster, when the firm was called in to advise on the installation of a new set of ropes for the great clock. It had been used on the clock and left in the well of the tower when it was replaced in 1935—after working since 1859. It had been made by R. H. Newell & Sons, a firm incorporated in British Ropes since 1924.

The Big Ben rope is to become an exhibit in the British Ropes' museum.

£80,000 Soaking Pits for James Booth

FIRST multi-zone, fully air circulated, radiant tube soaking pits in this country have been ordered from Stordy Engineering, Limited, Wolverhampton, by James Booth Aluminium, Limited, for installation in its Kitts Green Works, Birmingham. They will be used in conjunction with James Booth's 148-in., four-high, hot-reversing mill—the largest of its type in western Europe—which will be installed during the second half of 1961.

The £80,000 order includes the design, supply, and installation of two pits, each with a working size of 23 ft. 6 in. by 7 ft. 6 in. and a depth of 14 ft. to the underside of the lid. The total capacity of the two pits will be 120 tons of aluminium and the working temperature will be up to 620 deg. C.

The fully air circulated design has been specially developed by the manufacturers, and the radiant heating tubes will be fired by Stordy-Hauck oil burners. The contract also includes pit covers and electro-hydraulic travelling girder type cover lifting gear.

New 100-ton Crane for Cammell Laird

CLAIMED to be the largest in the world, a travelling crane capable of lifting and transferring prefabricated sections of up to 100 tons was demonstrated and handed over by the makers, Butters Bros. & Company, Limited, Glasgow, on Tuesday. The monotower crane, which cost more than £200,000, has been installed as part of the reconstruction work at the shipyard of Cammell Laird & Company (Shipbuilders & Engineers), Limited, Birkenhead.

The new crane has a 120 ft. high travelling tower and the point of its jib at minimum radius is 300 ft. from the ground. Apart from the jib, which is of aluminium alloy sections and plates, the structure is of rolled steel sections and plates.

NEW QUAY AT SUNDERLAND NEAR COMPLETION

WORK on an 850-ft. quay at the North Dock, Sunderland, for T. W. Greenwell & Company, Limited, shiprepairers, is nearing completion and should be in full operational use by the end of the year, Mr. Anthony Greenwell, managing director, announced on Tuesday. The work has been going on for three years and has involved the entire reconstruction of the dock.

It is intended to bring the quay into use before the end of the year for medium-sized vessels, but it is designed to accommodate 65,000-ton tankers.

THREE HORIZONTAL extrusion presses have been ordered from Fielding & Platt, Limited, Gloucester, by Aluminium Menziken, AG, of Switzerland. The contract is worth £250,000. The presses, designed for high speed production with a minimum of labour, range in power from 750 tons to 1,500 tons and will be hydraulically controlled from a central control desk.

Exports of British Coal

DETAILS of British coal exports and bunker coal shipments in July, and the totals for the first seven months of this year and last, are given below.

From	Month ended July 31.	Seven months ended July 31.	
	1960.	1959.	1960.
Categories.	Tons.	Tons.	Tons.
Anthracite—			
Large	8,539	50,164	43,892
Graded	29,455	144,720	149,363
Cleaned smalls	19,760	57,863	131,491
All other	23,792	202,281	171,672
Small coal (including household)—			
Unscreened	762	20,377	11,629
Large	32,025	119,514	349,859
Graded	25,865	147,953	232,697
Cleaned smalls	99,956	160,880	651,991
Untreated smalls	78,159	457,058	620,089
Other	10,803	143,104	94,491
Gas coal—			
Unscreened	13,297	86,240	120,621
Large	496	1,966	11,706
Graded	43,156	155,983	243,142
All other	5,406	11,935	17,265
Coking coal—			
Cleaned smalls	5,681	21,842	25,703
Other	11,823	64,638	63,050
TOTAL	408,975	1,846,518	2,938,661
Destinations.			
Canada	10,570	44,608	39,325
Other Commonwealth countries	5,009	9,040	19,278
Eire	79,394	426,765	677,416
Finland	4,583	8,657	25,321
Sweden	21,496	80,217	113,258
Norway	13,702	52,156	71,804
Denmark	119,376	489,599	886,329
Western Germany	30,660	129,328	245,865
Netherlands	65,850	185,785	468,692
Belgium	25,452	192,416	106,523
France	18,186	148,923	104,141
Portugal	8,903	15,222	92,023
Italy	5,570	33,982	64,824
Argentina	—	15,737	7
Other foreign countries	224	17,083	23,855
Fuel taken on board vessels engaged in the foreign trade (including fishing vessels) for their own use—			
British flag	12,441	362,225	217,247
Other flags	4,497	29,686	25,080

Exports of Coke and Patent Fuel

THE following table gives figures of exports of coke and manufactured fuel from the United Kingdom during July, and the totals for the first seven months of this year and last.

Products.	Month ended July 31.	Seven months ended July 31.	
	1960.	1959.	1960.
	Tons.	Tons.	Tons.
Gas coke	79,583	365,001	367,914
Hard coke	43,215	155,651	272,858
Breeze	36,516	263,038	235,156
Manufactured fuel	10,033	84,454	66,156
TOTAL	169,347	868,144	942,084

Imports and Exports of Mining Machinery

ACCORDING to Board of Trade returns, mining machinery (other than portable power tools) valued at £116,516 was imported during July, compared with £131,260 in July, 1959. Imports in the first seven months of this year were valued at £668,190 against £846,768 in the corresponding period of last year.

The appended table contains figures of export values of mining and well-drilling machinery in July, and values for the first seven months of this year and last.

Destination.	Month ended July 31.	Seven months ended July 31.	
	1960.	1959.	1960.
	£	£	£
Union of South Africa	24,050	296,975	316,431
Rhodesia and Nyasaland	9,863	100,781	28,636
India	96,486	982,753	701,064
Australia	45,263	163,499	250,775
Canada	17,454	129,622	197,853
Trinidad	10,442	239,882	226,750
Other Commonwealth countries and Eire	63,922	813,895	715,101
Netherlands	12,858	145,448	117,645
France	12,911	84,733	103,203
Venezuela	8,418	136,467	71,163
Other foreign countries	353,340	2,433,739	1,784,543
TOTALS.	665,007	5,527,794	4,513,164
Well-drilling machinery—			
Petroleum	242,541	2,629,257	1,618,689
Other	116,864	163,077	346,659
Mining machinery (excluding portable power tools)—			
Coal-cutters, power operated—			
Complete	34,639	350,134	283,643
Parts	51,441	360,649	464,994
Conveyors, underground—			
Complete and parts	97,054	701,171	692,061
Winders, power operated—			
Complete	637	82,907	113,950
Parts	5,565	164,973	119,517
All other	106,266	1,075,626	873,651
TOTAL	655,007	5,527,794	4,513,164

Lorry Mounted Crane Association

INAUGURAL committee of the Lorry Mounted Crane Association, formed at the end of last year to administer and direct the activities of the industry in Britain, has now established its rules of membership with the object of guaranteeing a minimum standard of insurance, safety, and reliability. The association will also attempt to rationalize legislation regarding the use of lorry mounted cranes.

Other objects of the association, which will not be concerned with the fixing of charges for hire of lorry mounted cranes, are the promotion of high standards in the practice of heavy lifting and the establishment of a minimum set of conditions of contract. Its headquarters is at 301, Glossop Road, Sheffield, 10.

CHELTENHAM MANUFACTURERS of Leonard thermostatic mixing valves, Unatap spray taps, and Arkon instruments, Walker, Crosweller & Company, Limited, has opened a new office block in the town. This houses its sales and service departments, which retain the old telephone number (Cheltenham 56317) and address. Departments at the factory have a new number—Cheltenham 56366.

R W G

This is the lower half of a gas turbine cylinder for a 2,500 kW gas turbo-alternator now running in a Midland steel works, converting the heat in waste blast-furnace gas into useful work. The provision of economical power is our business; and since we manufacture most of the main equipment for a power station such as boilers, turbines, alternators, condensers, feed heaters, cooling-water strainers, we are well equipped to design and carry through schemes for the efficient utilisation of any fuel.

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Imports and Exports of Iron and Steel

FIGURES of imports and exports of iron and steel in July are given in the following tables, based on Board of Trade returns, and including totals for the first seven months of 1959 and 1960.

Total Exports of Iron and Steel

Destination.	Month ended July 31.	Seven months ended July 31.	
	1960.	1959.	1960.
	Tons.	Tons.	Tons.
Cyprus	60	911	928
Sierra Leone	326	6,055	3,135
Ghana	1,414	17,965	11,394
Nigeria	6,200	44,271	37,189
Union of South Africa	4,031	26,079	43,922
Rhodesia and Nyasaland	2,030	13,012	15,191
Tanganyika	2,122	10,300	8,478
Kenya	2,480	11,998	17,550
Uganda	35	2,924	718
Mauritius	455	824	2,731
Aden	419	1,748	1,501
Bahrein, Qatar, and Trucial States	172	4,905	8,496
Kuwait	566	7,432	4,777
India	39,384	103,373	166,740
Pakistan	7,133	19,680	42,240
Singapore	2,152	12,971	11,774
Malaya	906	6,529	11,467
Ceylon	1,979	27,182	32,080
British North Borneo	253	1,743	2,531
Hongkong	6,527	40,763	48,940
Australia	16,562	49,655	100,522
New Zealand	11,959	55,199	62,708
Canada	11,891	99,940	139,348
Jamaica	1,401	13,252	14,269
Trinidad	4,357	26,052	26,796
British Guiana	830	4,192	5,421
Other Commonwealth countries	2,177	21,572	22,228
Eire	4,865	27,445	35,443
Soviet Union	3,139	7,501	20,108
Finland	5,350	20,078	28,201
Sweden	12,146	67,714	106,827
Norway	6,505	52,430	69,977
Denmark	8,462	56,101	59,270
Western Germany	8,735	63,320	87,404
Netherlands	12,076	55,870	77,712
Belgium	2,441	17,262	22,295
France	1,393	1,627	4,682
Switzerland	1,115	4,810	7,555
Portugal	1,339	9,737	9,324
Spain	4,359	19,115	31,027
Italy	3,494	31,669	24,917
Austria	402	2,108	3,095
Yugoslavia	2,367	1,776	24,102
Greece	3,535	6,972	11,766
Turkey	1,678	4,059	7,589
Netherlands Antilles	172	1,694	2,434
Portuguese East Africa	711	810	2,773
Egypt	407	1,272	6,975
Sudan	737	4,910	5,831
Lebanon	69	1,739	741
Israel	1,064	7,745	12,307
Saudi Arabia	84	2,824	298
Iraq	3,422	50,810	18,606
Iran	5,663	16,854	43,339
Burma	243	5,655	4,314
Thailand	391	5,677	3,545
Indonesia	2,271	3,310	17,320
China	4,520	27,343	35,691
Japan	3,138	84,745	43,662
Philippine Republic	661	3,098	5,345
USA	7,228	90,486	147,540
Cuba	250	4,480	5,452
Colombia	783	1,536	5,949
Venezuela	1,390	46,575	24,261
Ecuador	81	546	1,609
Peru	967	1,460	4,404
Chile	565	915	2,187
Brazil	1,325	15,327	21,180
Uruguay	288	705	5,271
Argentina	7,753	122,321	57,338
Other foreign countries	10,347	42,230	73,433
TOTAL	265,752	1,625,188	2,026,173

Total Imports of Iron and Steel

From	Month ended July 31.	Seven months ended July 31.	
	1960.	1959.	1960.
	Tons.	Tons.	Tons.
Union of South Africa	2,136	12,726	20,877
Rhodesia and Nyasaland	491	2,981	4,325
Canada	49,663	9,744	95,206
Other Commonwealth countries and Eire	7,104	6,640	21,914
Soviet Union	6,323	25,353	22,811
Sweden	4,601	15,234	28,573
Norway	13,895	47,056	89,843
Poland	139	3,222	8,056
Western Germany	11,540	34,864	90,695
Netherlands	15,488	103,507	129,409
Belgium	12,121	14,526	73,272
Luxembourg	1,503	4,495	9,530
France	6,638	13,410	42,099
Italy	1,366	8,054	18,443
Austria	1,224	2,537	7,845
Japan	567	1,410	4,015
U.S.A.	78,065	17,973	252,405
Other foreign countries	12,271	8,643	59,368
TOTAL	225,135	332,375	978,787
Iron and steel scrap and waste, fit only for the recovery of metal	25,299	2,511	97,834

Exports of Iron and Steel by Product

Product.	Month ended July 31.	Seven months ended July 31.	
	1960.	1959.	1960.
	Tons.	Tons.	Tons.
Pig-iron	9,599	72,239	102,095
Ferro-columbium (niobium)	4	26	78
Ferro-tungsten	28	739	514
Other ferro-alloys	511	2,987	6,172
Ingots, blooms, billets, slabs, sheet bars (incl. tinplate bars), and similar primary forms	801	42,530	20,792
Pieces roughly shaped by forging	110	1,018	775
Iron bars, rods, angles, shapes, and sections	251	764	1,102
Steel bars, rods, angles, sections, and shapes	51,669	215,118	378,057
Iron plates and sheets	134	238	527
Universal plates	2,499	4,614	13,004
Steel plate, 3mm. and under 4.5mm. thickness	3,874	26,603	24,344
Ditto, 4.5mm. or more in thickness	28,339	109,766	204,516
Blacksheets and blackplate	25,618	153,673	179,402
Hoop and strip	9,673	49,379	60,511
Tinplate	41,659	275,842	316,852
Decorated tinplate	596	5,529	2,970
Galvanized sheets	7,425	53,223	49,991
Other (incl. tinned sheets, terneplate, and ternesheets)	1,733	12,569	15,746
Railway and tramway construction material	21,381	97,808	102,415
Wire rods of steel (incl. alloy steel)	4,791	30,598	33,437
Wire	8,395	61,918	72,143
Tubes, pipes and fittings	46,662	408,007	440,730
TOTAL	265,752	1,625,188	2,026,173

MAJ. H. PHIPPS HERDMAN, divisional estates manager of the South Western Divisional Coal Board until his retirement some years ago, has died.

Mr. WM. WALLACE, manager of Granville Colliery, Swadlincote (Derby), for the past four years has died at the age of 55. He had been in the coal industry since leaving school. He obtained his manager's certificate in 1933, and before going to Granville Colliery was manager of Bretby, Cadley Hill, and Swadlincote collieries.

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